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MOTOR AGE

ROADS IN NEW HAMPSHIRE AND VERMONT

By James T. Sullivan

NO other eastern state has been a greater Mecca for motorists in recent years than New Hampshire. The number of residents who bought cars has steadily increased and the visitors from other states have totaled several thousand each summer. The scenic beauties of its far-famed lake region, together with its picturesque mountains, have proved a powerful magnet to attract motorists. So its statesmen realized that in order to increase a patronage which was bringing thousands of visitors who were spending money freely something should be done to improve the highways so that motorists who came once would make return visits.

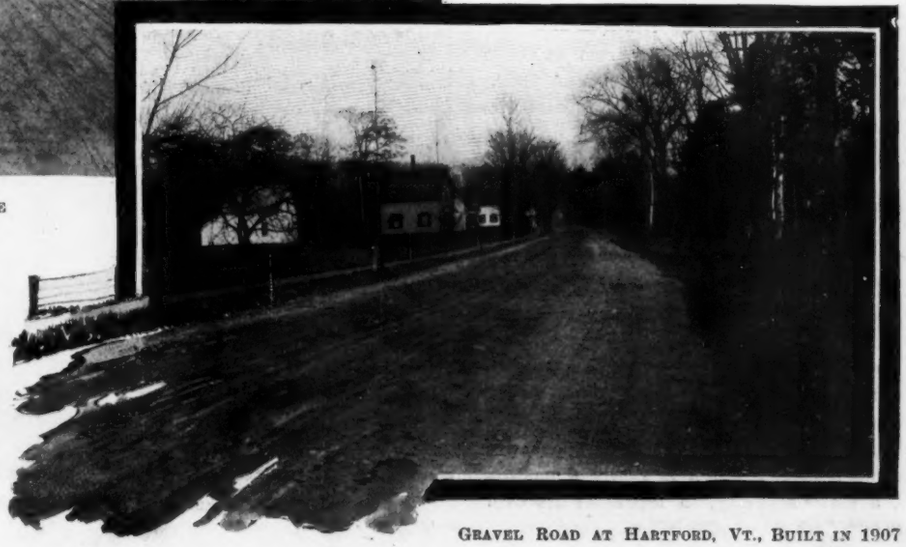
Therefore when it was proposed in 1907 to appropriate a sum of money annually for the maintenance of roads there practically was no opposition. Previously each town looked after its roads one way or another, but there was no systematic plan to make trunk roads. The example of Massachusetts was clearly apparent, and so the New Hampshire officials had something to go by. The state highway in Massachusetts extended directly to the New Hampshire line and it was plain that it would be a good plan to begin there and build a highway north to the lake and mountain region. The Merrimac river flows south and the valley is a very pretty one and the larger cities of the state are upon its banks.

New Hampshire's Road Scheme

An amendment to the general law was passed directing that a continuous highway be constructed from Massachusetts north, going through Nashua, Manchester, Concord, Franklin and Laconia to Weirs, the real gateway to Lake Winnipesaukee, the largest lake in the state. From that point north the highways circling Asquam lake, the next in point of importance, are very fair gravel roads and they are kept in good condition so that those who go north this way find good traveling. The state officials got busy with the trunk highway and there already has been constructed 18 miles of it along the river. This is mostly along the southern section of the river. The three big cities, Nashua, Manchester and Concord, cover quite an area in width and as each city has a fine main street practically a continuance of the highway and which is not charged up in the fund for state highways this helps out much in lengthening out the total by several miles.

Under the act of 1907 it was arranged that $125,000 should be set aside annually for 6 years for the purpose of creating state highways. The governor and council have charge of the expenditure of the money. A state highway department was created and engineers appointed. A. W. Dean is the present state engineer and Frank W. Brown assistant state engineer. Through them practically all of the work is done. The act provided that each town should set apart a sum for the permanent improvement of its main highways. The amount is as follows: Towns having a valuation of less than $2,000,000, $1 on

SECTION OF FINISHED ROAD IN NEW HAMPSHIRE



GRAVEL ROAD AT HARTFORD, VT., BUILT IN 1907

SMOOTH HARD ROAD AT ENOSBURG, VT.

each $1,000; between $2,000,000 and $3,000,000, $0.75; from $3,000,000 to $5,000,000, $0.50; from $5,000,000 to $15,000,000, $0.33⅓; towns above the latter figure, $0.25 per $1,000. The county commissioners are directed to set apart $1 on each $1,000 in unincorporated towns or places in which there are highways.

State Aid Promised

The act also provides that the state shall extend aid to the towns or places which apply for such before May 1 each year. It allows towns to apply for money to make permanent improvements on their roads exclusive of the ones contemplated by the raising of the money as set forth above. Each town may appropriate an additional sum equal to 50 per cent of the amount set apart on the basis of its valuation. The state then steps in with its aid on the following basis: Towns and places having a valuation of $100,000 or less, $3 for each $1 set apart; from $100,000 to $250,000, $1.25 per $1; between $250,000 and $500,000, $0.60 per $1; from $500,000 to $1,000,000, $0.40 per $1; between $1,000,000 and $3,000,000, $0.25 per $1; all cities and towns having a valuation of $3,000,000 and upward, $0.20 per $1.

This money is known as a joint fund for the permanent improvement of such highways as the governor and council and municipal authorities shall designate. It is provided that none of this money shall be expended on any highway in the compact part of any city or town except in towns of fewer than 2,500 people. In other words, each city and town must keep its main street, which is really a portion of a state highway, in repair at its own expense without aid from the state. This allows the money appropriated to be stretched out in the outlying parts and thereby gradually connects the roads between one town and another until finally there will be built a good system of state highways.

When a town wishes the services of an engineer the state furnishes such an official to aid in the work of construction. Most of the work is advertised and done by contract but each town may do the work within its limits, at cost, by rendering weekly statements to the highway department.

In addition to the Merrimac valley highway the state has provided for another trunk road through the mountains. This begins away up at Dixville, nearly at the top of the state and some 75 miles from Bretton Woods, the Glidden tour rendezvous. This road winds down through the mountains circling the Presidential range and along the beautiful Androscoggin river and through to Woodstock. In this section of the mountains John Anderson and J. D. Price, the two hotel men who handle the big hostelries at Bretton Woods, have interested other hotel men and many roads have been widened and improved for motor cars in the heart of the mountains for which these men have paid all the cost amounting, now to nearly $10,000 up to the present. These roads connect with the regular state roads and are valuable links in the chain about to be constructed. Then there also is the Hurricane mountain road from Chatham to Conway, which is to be made a state highway. When these are all finished New Hampshire will afford the tourist a great deal of pleasure.

There has been constructed up to date very nearly 250 miles of state highway. Of this amount about 25 per cent is macadam. The macadam has been built both of trap rock and native stone. The native stone is mostly granite. The balance of the roads is gravel. There has been a lot of work done toward reducing grades and underdraining the roads. They have been widened, too, in a number of places. An illustration shows how the gravel roads are constructed by some of the towns. There is a good foundation of rock followed by a solid packing of gravel.

Nineteen hundred and eight was a hard year on the roads in New Hampshire. There was little rain and the gravel roads were cut up a great deal because of the

VERMONT ROAD RELOCATED TO REDUCE GRADE FROM 18 TO 7 PER CENT

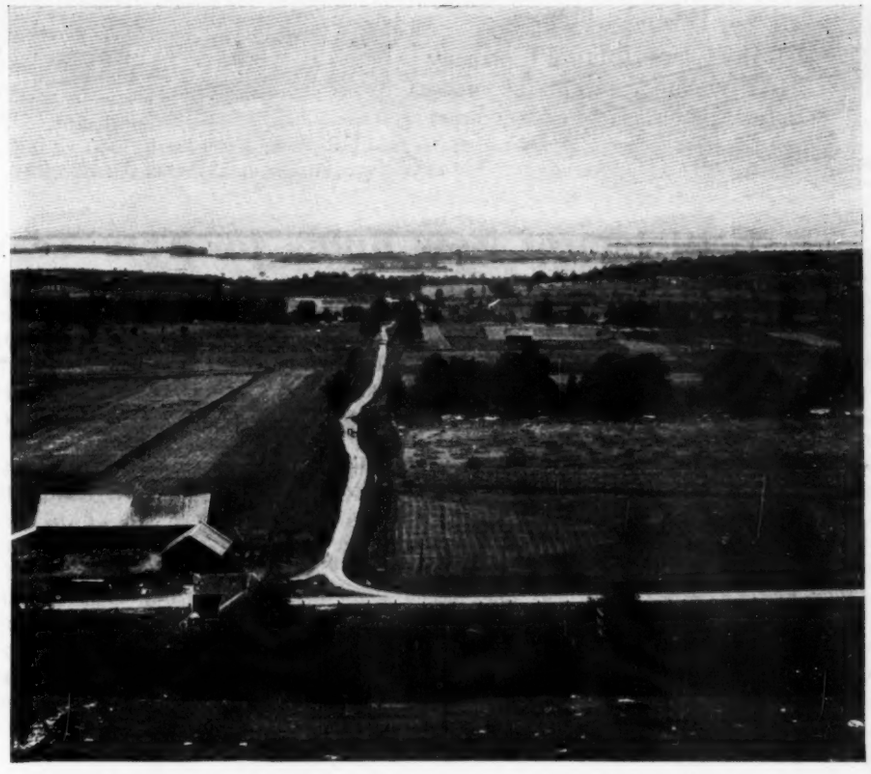
large amount of travel, which resulted in much sand where ordinarily, if there had been rain, it would have washed away the accumulations and left the roadbed hard. An evidence of the great increase in motor travel in the state is shown by the fact that in 1907 800 cars visited Bretton Woods, a number that was thought remarkable and never would be approached. Yet in 1908, during the few summer months, there were 1,200 motor cars at the mountain resorts and had the hotels remained open through October it is safe to assume the total would have been close to 1,500.

Vermont Gets Early Start

Vermont really began its work for the building of good roads back in 1894 when an act was passed providing for a 5 per cent tax on the grand list of the state which was reapportioned to the towns on a basis of road mileage. This fund now reaches very nearly $100,000 a year, which is spent in building, in a permanent way, portions of the main highways in each town of the state. For 4 years this law was in effect without any supervision by the state.

In 1898 the legislature passed an act creating the office of state highway commissioner, to be filled by appointment once in 2 years. Charles W. Gates is the present commissioner. The act of 1898 gives him complete supervision of the expenditure of the above fund in each town. It also provides for annual county meetings of the town road commissioners for the purpose of discussing plans of road building and maintainance.

It was found after 8 years' trial that one person could not properly supervise the work, and in 1906 the legislature raised the salary of the commissioner from $4 a day to $1,800 yearly and expenses. It also provided for the appointment of county supervisors who are each paid $3 a day and expenses. In addition to the 5 per cent tax the legislature now appropriates annually $50,000 to be available to towns that will duplicate in amount the sums called for, the limit in each town being not less than $100 nor more than $300.



FAMOUS MILL RIVER ROAD ALONG SHORES OF LAKE CHAMPLAIN, VT.

Towns Maintain the Roads

An average of 50 miles of road was improved each year during the first 10 years, and since then this mileage has been increased from 60 to 90 miles, the number for 1907 being 92 miles. Towns are required by law to maintain all roads and are required to assess a tax of not less than 20 per cent of the grand list for that purpose.

The present plan of the state road fund is to place it on sections of selected highways in as permanent a manner as possible. Bad grades are corrected when possible, or roads relocated when necessary. Some of the roads had very sharp grades and when work was first started these were rearranged by a system of building up each year until the road in time has become fairly level.

Many of the roads had blind corners or curves that gave a short sharp bend. These bends have been ripped out so that where a right angle turn within a space of a few yards formerly existed there is now a nearly straight line or a sweeping curve. Many highways were merely paths where two vehicles passed so close together that it required skillful driving to prevent accidents. A number of these have been widened and drained. A telford foundation is generally laid with field stone or stones from the old walls beside the road and surfaced with the best gravel obtainable.

Gravel and Telford Popular

These improvements are considered permanent, and the whole work is done with the idea of its being a serviceable and comparatively inexpensive road for present use and one that will furnish a good foundation for a better surface at any future time whenever the state can afford it. These gravel and telford roads are, cost of construction and maintainance considered, the most economical and the most satisfactory the state can build with the present appropriations.

LAYING FOUNDATION FOR GRAVEL ROAD IN NEW HAMPSHIRE

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MOTOR AGE

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Criticism of New Rules for This Year's Glidden Tour

THE new Glidden rules as announced for the coming classic tour of America are complete in comparison with previous rules and if lived up to the tour should be of great value to the American maker and also the American buyer. The rules have apparently been designed to test the chassis of a car, for no recognition is taken of the body parts, or the many attachments, such as tops, windshields, lamps, speedometers and like accessories. Tires also are eliminated from the penalty list, so that it would appear that whatever black marks are credited to a car at the finish will have been occasioned by troubles in the chassis parts, including motor, clutch, gearset and axles, together with their many parts connected therewith. This is certainly along the right line, which was realized by the Chicago Motor Club and put into force during its recent 1,000-mile contest. The maker wants to test his car, not the tires, and the 1909 Glidden will give him a chance to do this.

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BUT the new rules go much further than this in comparison with the old ones: Now the driver and mechanic are going to be penalized for work done on the car, for repairs made, for being late at controls and for defects in the chassis at the completion of the run. These rules say adieu to the making of new parts in a roadside blacksmith shop and the fitting of them without a point of penalty providing the car made its control on time. This means the discontinuance of that practice of a maker being disqualified if he had to replace a bolt and did not have an extra one with him, while another contestant could manufacture a truss rod for a back axle and put it in the place of the broken one without a point of demerit charged against him. The new rules augur a real contest, one in which defects count against the car and where the car with the cleanest record gets the cleanest and highest score, and where the car that has given a dozen little troubles along the run gets its deserved penalties recorded against it.

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YET the rules do not stop here, but permit of taking control of the cars at the end of the run, when they will be examined for lost, loose and imperfect parts, and when due penalties will be meted out according to the importance of the part and in accordance with a code of penalties to be published previous to the start of the tour. The final examination has been the salvation of the reliability contest in America in that it has in many cases counted out the car that has finished the run with a perfect road score but has reached the finishing point with sprung axles, broken springs, dished wheels and a dozen and one other evidences of weak constructions or carelessness of the driver on the road. It is to be hoped that the list of final penalties will be kept as low as possible and that they will be in harmony with the penalties inflicted during the tour for work done on a car either by way of repairs, replacement or lateness at a control. There should be a proper perspective maintained among all four, and while the arrival at a scale of penalties rated on the relative importance of the many car parts as well as the comparative value of time spent on repairs and replacements is a stupendous task, it is one that the committee should wrestle with bravely and which if not absolutely acurate should be sufficiently so so that minor corrections would make it ideal for a succeeding tour. There is a conspicuous improvement in the classification adopted, and, after all, when the classification is corrected a big half of the task is accomplished. The rules call for five classes, $999, $1,750, $2,450 and $3,750 being the dividing marks. An analysis of the many cars listed for this season shows that the big classes will be from $1,000 to $1,750 and from $2,451 to $3,751; while the high-priced machines will be in the class over the $3,751 mark. This is a rational classification. It puts everything under $999 in a class by itself; then there is a class for the big cheap car division from $1,000 to $1,750; and in a class by themselves are the scores of cars listing between $2,451 and $3,751, in which a big part of the industry is represented. The cars in the class over $3,751 mark are of the de luxe type, with palatial body designs, the highest grades of steel, ball bearings in many parts, and in brief are the best products of the oldest makers. There will be a few disappointed with the classification, but it is a good one for the industry where price is the basis of classification. Were price not the criterion cylinder capacity could be used to excellent advantage.

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THE rules place more importance on the observer situation, and unless greater discretion is used in the selection of observers than previously a great percentage of the worth of the run will be lost. If observers are good the tour will be valuable, and if not it will at best be most dissatisfying. Experience has proven that poor observers are workers of the greatest mischief. It is surprising that although the maker has it impressed upon him that the observer is the crux of the situation, yet he frequently takes a last moment possibility and then frequently makes half a dozen changes on the run. The observer should be the head engineer or one of his assistants or factory hands in preference to a road tester or demonstrator. The observer should be as reliable and stable a production as it is possible to find and if the entrant does not nominate such a character then the contest board should refuse to honor the nomination and put up a nominee of its own at the expense of the entrant. Good rules and good road regulations are useless if the observer is deficient and subject to likes and dislikes that warp his judgment and veracity. The danger of the observer becoming a confederate with the driver is as great as is that of his becoming an assassin with the dagger ready; both should be barred and if their real nature is not discovered before the start their elimination should be speedy when provocation and proof are discovered.

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A COMMENDABLE change in the new rules is the difference in the running schedule among the five classes. As heretofore, the big car class starts on scratch, and the remaining four classes are given time handicaps according to the length of the day's run. If the day's run is less than 7½ hours the smallest car has a leeway of 40 minutes; if it is over 7½ and less than 9 hours, this car has a leeway of a whole hour, and if it is over 9 hours the leeway is 1 hour and 20 minutes. This advantage given the smaller cars is particularly favorable when compared with last year's schedule. This leeway is not needed because small cars cannot maintain a certain schedule, but because in maintaining it they are racked much more than are the big cars. This was particularly evident in last year's run; when the finish at Saratoga arrived not a few of the smaller cars had maintained schedules and were in running commission, but carried not a few sprung and deranged parts that would have proved embarrassing had the contest continued a few days longer. A small car when compared with a big one cannot make up for time lost on delays.

A. A A. SUSTAINS PROTEST OF THE PREMIER

Decision of Hower's Contest Committee in Philadelphia Reliability Row Stirs the Quakers

PHILADELPHIA, PA., Jan. 25—According to the findings of the new contest board of the American Automobile Association at a special meeting in New York, Thursday, January 21, the protest entered by the Premier Mfg. Co. against disqualification of its car in the New Year's endurance run, conducted by the Quaker City Motor Club, was sustained, the disqualification being removed. The facts relative to the disqualification of this car when climbing Giant's Despair hill on the run were briefly as follows: Ray McNamara, driving the Premier, when ascending Giant's Despair encountered a blockade on one of the steepest parts of the hill, in which blockade a contesting car was stalled angling across the icy road. As reports have it, McNamara's passengers jumped out when he pulled to the side of the road and partly into the ditch to pass the blockade. The Premier continued without its load until the blockade was passed, after which the passengers were taken on and the remainder of the ascent of the hill made. For this act the Premier car, which passed perfectly the technical examination in the run, was disqualified and the trophy was awarded to the Matheson car. After the protest was filed intense interest was demonstrated on the part of the Premier interests as well as the Quaker City Motor Club, both placing the matter in the hands of special attorneys, who presented the respective sides of the case before Chairman Hower, of the contest board. The findings of the board, after hearing the evidence, are as follows:

Finding of the Board

1—The printed rules governing the contest the Quaker City Motor Club, of Philadelphia, do not state what course is to be followed in case of loss of traction, nor what penalty will be incurred for allowing passengers to dismount until traction is regained.

2—In the case of loss of traction, wherein the motor of the car has not stopped or the clutch been disengaged, it is fair to assume that the driver of the car has the right to use such means as may be available to overcome his immediate difficulties, taking into consideration the safety of his passengers, his car, and other contestants.

3—Affidavits and evidence submitted show that J. R. Overpeck, in behalf of the contest committee of the Quaker City Motor Club of Philadelphia, interpreted the rules of the contest to the drivers. Mechanicians and observers at a meeting held the night preceding the race. The evidence shows that J. R. Overpeck states substantially in reply to a question, that in case of loss of traction, passengers would be allowed to dismount until traction should be regained without incurring penalty.

4—The above statement is not shown to be refuted by J. R. Overpeck, and G. Douglas Bartlett, attorney for the Quaker City Motor Club, and E. C. Sellers, representing that club, agreed that its contest board will sustain any statements made by J. R. Overpeck upon the occasion stated.

5—It is the opinion of this contest board that the driver of Premier car No. 21 acted within the privileges granted by J. R. Overpeck in permitting his passengers to alight from his car until traction was regained; that he could not with safety have passed around Acme car No. 4, which was stalled diagonally across the road, without discharging his passengers for that purpose, that he stopped his car after passing around Acme car No. 4 at the first point permitted by safety to his car, his passengers and other contestants, and that he put the proper construction upon the phrases "loss of traction" and "regaining traction."

The contest board of the American Automobile Association is unanimous in its findings sustaining the protest of the Premier Motor Mfg. Co., and reversing the decision of the contest committee of the Quaker City Motor Club of Philadelphia.

Quakers Are Indignant

The officials of the Quaker City Motor Club are particularly indignant over the findings of the contest board of the A. A. A., and have notified Secretary F. H. Elliott, of the A. A. A., that they will appeal to the executive board of the national body on the ground that the contest board of the A. A. A. had no jurisdiction in the case. Counsel G. D. Bartlett, for the club, stated that if necessary to maintain its rights the Quaker City Motor Club would withdraw from the national body, that the A. A. A. contest board has no recognized set of rules applying to endurance runs, and that the Quaker City Motor Club formulated a set of its own, and in addition that the regulation of such an affair rests with the club promoting it and accordingly the interpretation of all rules must of necessity remain with the club's officials. There seems to be some doubt regarding whether a penalization on the time score will still remain against the Premier car, because in the preliminary hearing of the Giant's Despair incident by the officials of the Quaker City Motor Club the testimony all pointed one way, so that the club's officials were unanimous in eliminating the car by disqualification. When turned over to the technical committee of the club that body gave the car the same looking over it gave the others, and it proved to be the only one to pass the rigid inspection unscathed. The club's contest committee, however, in view of the fact that the car's disqualification was a foregone conclusion, did not even take the trouble to make up the Premier's road time penalties, of which it is claimed it had some. President Folwell, of the Q. C. M. C., has drawn attention to the fact that the checkers' and observers' cards show penalties against the car which he states will place it not better than fourth. According to the club president, the Matheson car won the McDonald cup and doubtless will retain it.

American Show Dates

Philadelphia	January 27-February 3
Chicago	February 6-13
Denver	February 16-18
Detroit	February 15-20
Toronto	February 18-25
Hartford	February 20-27
Cleveland	February 22-27
Omaha	February 24-28
Buffalo	March 1-6
Kansas City	March 8-13
Minneapolis	March 13-20
Rochester	March 15-20
Pittsburg	March 27-April 3

WASHINGTON, D. C., Jan. 23—Much to the surprise of everyone, the senate has declined to agree to an appropriation of $12,000 for the purchase and maintenance of motor cars for the use of President-elect Taft. The house of representatives promptly passed the item, but as the senate would not agree to it, the matter has been temporarily side-tracked. No one doubts for a moment that some means will not be found whereby Mr. Taft can use motor cars instead of horses.

Tawney Explains Item

Representative Tawney in explaining the item to the house said: "I think the congress has authority to appropriate money unquestionably for the purchase of motor cars for the president. There is an appropriation of $25,000, a miscellaneous appropriation, out of which the horses for the president have heretofore been purchased. The committee was informed that the president-elect intends to practically abandon the use of horses for reasons of his own and use the motor car as a means of conveyance instead of a carriage and horses. Under the law as it now exists it is not possible for him to purchase the motor cars out of the appropriation made for the current fiscal year, and in order to make the motor cars available for use by March 4 it is necessary to provide in this bill specifically for the purchase and maintenance of these motor cars during the remainder of the fiscal year from March 4 to July 1."

No Horse For Speaker

While the house of representatives was appropriating money with which to purchase motor cars for the new president, the senate was in a wrangle over an appropriation of $5,000 for a carriage and horse, or other vehicle for the speaker of the house. The words "or other vehicle" were construed by many senators to mean motor cars and they promptly aired their views on the motor car. Senator Warren paid a glowing tribute to the motor car. "I may say that it has become necessary in the ranch business, in which I am interested, to use motor cars for many purposes, including that of hunting lost horses, because it is a matter of speed and economy. At the present quotation of prices of motor cars given us for the next season they are relatively cheaper than horses, cheaper to maintain, and it is in the interest of the government that so fast as we may be able to use motor cars to advantage in place of horses we should adopt them without the least hesitation."

Senator Bailey replied that Senator Warren had a perfect right, if it suited his taste or his pocketbook, to buy and use motor cars on his own ranch, and if his horses, either hitched or loose, took fright, that was their owner's own concern, and not the public's.

DECORATIONS READY FOR CHICAGO SHOW

CHICAGO, Jan. 25—Notwithstanding the absence of General Manager Samuel A. Miles, who is ill in New York city, preparations for the N. A. A. M. show which will open in Chicago a week from Saturday are being rushed by Assistant Manager Fest, who has his affairs in such shape that he expects to be able to put his decorators to work in the two big buildings, the Coliseum and the First Regiment armory, by next Monday. This will be the earliest the show people ever have been given the keys to the buildings and will enable the decorators to finish their work in plenty of time for the exhibitors to get in and have everything in readiness for the opening of the show. This time the slow ones will not be able to blame the decorators.

Anticipating securing the buildings early, Miles and Fest have pushed along the work of making the decorations and as a result they have all the papier mache and stucco embellishments ready now. They are stored in two warehouses and there will be no delay in installing them. Those who have had a peep at the decorations predict that the Chicago show will be more beautiful than ever. Collaborating, Manager Miles and Artist Thiede have devised a color scheme in which copper, bronze and old gold will play an important part. Old Mercury will again be "on the job," but he will be dignified this time by being in the center of stained glass windows in variegated colors instead of staring down, a mass of stucco, from a red or green board as he has done for several years past. Green silk and golden trimmings also will be used in the show.

In the way of signs the show visitor can locate the different exhibitors easily, because the signs themselves will be placed on the top of the sections. They will consist of white and gold raised letters on a red silk background, and immediately above will be placed white flower boxes filled to a height of 2 feet with real ferns and flowers.

Papier mache has been largely used in the decorative work, although stucco has not been entirely discarded. Manager Miles tried papier mache for the first time in his last show and he found it preferable because of its comparatively light weight, so he has retained it. As an argument for its use, it is pointed out that two men can handle a piece of papier mache decoration where it takes ten men to move plaster. This, therefore, will greatly facilitate the installation of the decorations. Two hundred girls have been engaged making these and in addition fifty painters and half a dozen sculptors have been working under the orders of Assistant Manager Fest.

The Chicago show will have in the neighborhood of 255 exhibitors, smaller, perhaps, than at either of the New York shows, but on the other hand, the spaces at Chicago are claimed to be much larger than the ones in the east. It wasn't because Miles could not get more exhibitors that the list is confined to 255 names—he simply could not place any more. Even now he has a waiting list a yard long, and it is hinted that one of the reasons he went to New York was to dodge those who came here simply insisting they must be given space.

Baltimore Selects Dates

Baltimore, Md., Jan. 24—The Automobile Club of Maryland has decided to promote a motor car show in this city to run from February 24 to 27, inclusive. This decision was reached late last night when a deal was closed for the Fifth Regiment armory as the place for holding the show. The committee in charge of the affair, Dixon O. Walker, chairman, and C. H. Milliken, Frank W. Darling and Dr. H. M. Rowe, hope to make the show excel any of those held in the past, and will start at once on the details. The committee announced that while the club will promote the show, the dealers will co-operate, so that the displays will include practically all of the makes of cars represented in Baltimore, as well as the accessories and other things. The Fifth Regiment armory is well adapted for holding the show and is large enough to hold all the cars that the dealers of Baltimore and Washington can put on the floor and take care of a large crowd. This will be the first show to be promoted by the club

All St. Louis Space Gone

St. Louis, Mo., Jan. 25—With all principal space contracts signed, the St. Louis Automobile Manufacturers' and Dealers' Association is looking forward to an important show at the Coliseum February 15 to 20. The smaller exhibitors which will be in the annex and the gallery have not yet been assigned their locations, but it is expected that this matter will be settled before the end of the week. All other contracts, including those for decoration, music and motion pictures and many other arrangements to promote the success of the exhibition, have been closed and the work fairly started. Those who will occupy the main floor are: Peper Auto Co., Overland; Moon Motor Car Co., Moon; Union E. L. & P. Co., Studebaker electric; Deere Plow Co., Jackson; South Side Auto Co., Matheson and Stanley; Park Auto Co., Thomas, Baker and Chalmers-Detroit; Victor Auto Mfg. Co., Victor; Doyle-Curran Motor Car Co., Frayer-Miller; Weber Implement Co., Mitchell; Delmar Motor Car Co., Regal; Swingley Motor Car Co., Stoddard-Dayton; Bagnell Auto Co., Cadillac; Van Auto Co., Marmon; Maxwell-Briscoe Motor Co., Maxwell; C. F. & J. R. Brown, Peerless; Mississippi Valley Auto Corporation, Stearns and Detroit electric; Colonial Auto Co., E-M-F, Studebaker and White; Buick Motor Co., Buick; Halsey Auto Co., Packard and Stevens-Duryea; Western Auto Co., Pierce-Arrow; Ford Motor Co., Ford; Dorris Motor Car Co., Dorris.

Cleveland Spending Money

Cleveland, O., Jan. 25—Washington's birthday, February 22, will see the opening of the Cleveland show this year. The show will continue throughout the week, winding up February 27. More money by far is being spent on the show this year than ever before. Exclusive of the electrical effects and the fountains, the decorations will cost over $5,000. Nor does this include the amount which must be spent to put up the decorations. The latter item will be considerable, while the lighting and wiring contract will run close to $4,500, if not more. This will bring the total expense over $10,000—nearly twice as much as has ever been spent before on a local exhibition.

CONNECTICUT ROAD PLANS

Hartford, Conn., Jan. 27—At this time the one topic of interest aside from legislation is the matter of road improvement. In the betterment of the highways, Connecticut has become noted, at least this is the prevailing impression. There are approximately about 15,000 miles of road throughout the state of Connecticut classed as good, bad or otherwise. Of this mileage, compared with the area of the state, 5,000 miles is described as trunk lines leading to and emanating from the more important or larger cities and towns. The system is so divided that State Highway Commissioner James H. MacDonald has selected 1,032 miles as the first series of the trunk lines to be improved. So carefully have the roads comprising this 1,032 miles been chosen that they look to the interests of about 800,000 people, and pass through 138 of the 168 towns throughout the state. The trunk lines number fourteen. The state pays the entire cost of construction under the present law, the towns benefiting reimbursing the state for their share after the work is done and accepted. The last legislature made an appropriation of $4,500,000 for good roads, same to be distributed over a period of six years, or $750,000 a year. Of this $750,000, $500,000 is for work in the towns proper, while the remaining $250,000 is to be devoted to trunk lines in which expenditure the towns have no voice, but, under the law they are obliged to reimburse the state for their share of the cost.

Commissioner MacDonald has, during the past season, traveled 11,000 miles in his car carrying out the work of the commission. Up to date, although the appropriation for the year is but $750,000, the law, according the privilege of arranging for expenditures of 2 years' ap-

propriation, $804,366 in contracts have been let. Of this amount, $259,044 represents trunk line money, so that the entire year's appropriation has been arranged for. The mileage represented by this money is 109, classified as follows: Macadam, 55 miles; gravel, 32 miles; grading, 18 miles, and telford, 4 miles. A large share of the work contracted for early in the season has been completed and accepted.

BALTIMORE ROADS MECCA

Baltimore, Md., Jan. 23—The next convention of the National Good Roads Congress and the National Good Roads Association undoubtedly will be held in this city next April. Secretary James C. Bartholf, of the organization, called upon Governor Crothers, Mayor Mahool and President William B. Hurst, of the Merchants and Manufacturers' Association, during the week and explained to them that the executive committee of the congress had practically decided on Baltimore as the next meeting place. Previous to Secretary Bartholf's visit, Martin Dodge, of Dodge Park, Md., formerly state senator from Ohio and at present vice-president of the National Good Roads Congress and Good Roads Association, came to Baltimore and requested Governor Crothers and Mayor Mahool to cooperate with the organization in an effort to bring the convention here. The governor promised to do everything to make the convention a success and the mayor agreed to secure McCoy hall of the Hopkins university for the proposed meeting. Governor Crothers, upon Mr. Dodge's request, will name a committee from all parts of the state to make arrangements.

IMPORTERS ELECT OFFICERS

New York, Jan. 25—The annual stockholders' meeting of the Importers' Automobile Salon was held January 21. The efforts of the members to have Andre Massenat, general manager of the American branch of Panhard & Levassor, continue as president were unsuccessful, he declining the honor and stating that present conditions necessitates his undivided attention to his firm's interests at this time. No surprise was felt, therefore, when W. H. Barnard, the vice-president of last year, was elected president for the ensuing year. Mr. Barnard is the head of the Delahaye Import Co. Paul LaCroix, general manager for the American branch of Renault Freres, was elected vice-president, and Walter C. Allen, of the Lorraine-Dietrich Import Co., succeeds himself as treasurer. E. Rand Hollander, vice-president of the Fiat Automobile Co., was elected secretary. In addition the following were elected to serve on the board of directors with the officers: Andre Massenat, Panhard & Levassor; H. Fosdick, Hol-Tan Co.; C. Andrade, Jr., Isotta Import Co.; Julien Block, C. G. V. Import Co. Walter R. Lee was reelected general manager.

QUAKER SHOW BIG ONE

Garden Exhibition Is Followed by Annual Affair at Philadelphia —Mid-Week Start

Philadelphia, Pa., Jan. 25—The eighth annual show of the Philadelphia Automobile Trade Asosciation, in the Second Regiment armory, will be opened to the public at 8 o'clock next Wednesday evening. While the armory is the largest suitable structure in the city, it is yet about 50 per cent short of the requirements. All hands knew of the dearth of space, and the first press notice had hardly been issued before every available bit of room had been pre-empted, and the committee was compelled to resolve itself into a board of adjustment to accommodate as many of the applicants as possible.

While the members of the association—there are forty-five of them—were naturally given first choice as regards location, the spaces were laid down of a uniform size and each concern was allowed but one of them. In that way only could even the "early birds" be accommodated. That the committee has worked to some purpose may be gathered from the fact that by thus limiting the space assignments fifty of the three-score cars represented in Philadelphia will have found a resting place under the armory roof when the ball drops next Wednesday night. With each annually-recurring show there is a howl for a big exhibition building in this "conservative and slow-going" old burg; such a plaint is rising now from various quarters. And—who knows?—perhaps by this time next year there may be such a building here, and Philadelphia will come to its own as a show center, and give the national exhibitions a rub for the honors. Apropos of this, a movement has been started to make such additions to the building in which the show is being held as to double the amount of floor space, and provide the city with a much-needed exhibition building before the end of the present year.

At the Philadelphia show the licensed and the unlicensed car will lie down together, and the foreigner will fraternize with both. There will be no side issues in the way of upstairs, basement or company-room exhibits. Even the accessories and the trade journals will be on a level with the big cars. Nobody will be compelled to climb up and down but the band. It will be one of the most compact and easily-get-atable shows ever held in this city—or any other.

The innovation of a mid-week start—necessitated by the fortnight's interval between the New York and Chicago shows—will be watched with interest. The 3 days intervening between the close of the garden exhibition and the beginning of the Quaker show permit of the bringing here of many of the former's exhibits without the usual rush which marked the Saturday or Monday openings for former years. But with only 3 days' interval between the close of the Philadelphia show and the opening of the Windy city affair some of the exhibits which are scheduled for both will have to be handled very quickly in order to reach Chicago by Saturday night.

The cars which will be on exhibit will include the Acme, American, Apperson, Autocar, Brush, Cadillac, Carroll, Chadwick, Chalmers-Detroit, Columbia, Crawford, Elmore, E-M-F 30, Fiat, Ford, Franklin, Gaeth, Grout, Isotta, Jackson, Knox, Lancia, Locomobile, Lozier, Marmon, Matheson, Maxwell, Middleby, Mitchell, National, Overland, Packard, Palmer & Singer, Peerless, Pennsylvania, Pierce-Arrow, Pullman, Rambler, Regal-Detroit, Royal Tourist, Simplex, Speedwell, Stanley, Stearns, Stevens-Duryea, Stoddard-Dayton, Studebaker, Thomas, White steamer, Winton—just an even half-hundred, including the Carroll carbonic acid gas car, which will be on exhibition for the first time.

The apparent dearth of accessories exhibits will be explained by the inability of the show committee to scare up space. About a score of odd corners here and there were awarded to applicants in the order in which the requests were mailed. A full score of disappointed applicants, including several motor car dealers, were left out in the cold. Partly as a result of this, and partly from choice, several of the gasoline row concerns will run individual shows, with all the usual musical, decorative and gastronomic side features. Among these will be the Oldsmobile, Reo, Buick and a few others.

POPE-TOLEDO PLANT SOLD

New York, Jan. 23—The entire business and assets of the Pope Motor Car Co., of Toledo, O., manufacturing the Pope-Toledo, have been purchased by the strong syndicate of eastern capitalists headed by Richard D. Apperson, of Lynchburg, Va. Mr. Apperson is at the head of several large public corporations through the south and is also vice-president of the American National Bank, of Lynchburg, Va. The new company will be known as the Apperson-Toledo Motor Co. and the car as the Toledo. The people interested in the new organization have no connection with other motoring interests. The deal was closed ½ hour before the New York show opened, but was not made public until Thursday noon. Flattering offers have been made to the new owners to move the plant east, but it is reported that the chamber of commerce of the city of Toledo, O., will make a strong fight to keep it there. As soon as the transfer is completed it is the intention of the new owners to open the works to their full capacity. The new company will continue manufacturing the cars displayed at the Madison Square garden show and heretofore known as the Pope-Toledo.

MODERN TREND OF DESIGN IN MOTOR BRAKES

EDITOR'S NOTE—The following paper on the "Modern Trend of Brake Design," prepared by Lawrence Whitcomb and Thomas J. Fay, was read at the last meeting of the Society of Automobile Engineers.

IT WILL not be necessary to consider the competence of the brakes beyond the negative torque that just balances the motor's ability in the process of rendering the points to be here made clear. Even in the abstract, if the motor can slip the traction wheels, the brakes can do no more, so that the torque of the motor would then be the measure of the negative torque of the brakes. In this there would be a factor of safety since the car would stop of its own accord were the power cut off. If it takes a drawbar pull of 20 pounds per ton mile to propel a car, this will be the measure of the negative effort with the impelling power removed, and the magnitude of the increment for good measure, assuming the brakes are designed in point of negative torque, equal to the mean effective torque of the motor in a car of harmonious design.

Torque as a Basis

It is fortunate that the brakes can be designed taking the torque of the motor as a basis, since much uncertainty exists as to the data from the reverse point of view. The reasoning is rational, since a car can go no faster than its motor will drive it, and brakes of a negative ability equal to the positive ability of the motor, would snub the speed of the car at the rate of acceleration due to the motor, minus the resistance offered by the car. The car would be brought to a stand by the brakes then, in considerably less distance than that in which the motor would accelerate it. No set of brakes can do more, if it be true that the motor can slip the wheels. On the other hand, a motor that cannot slip the wheels, cannot impel a car at its maximum possible speed, and the relation of the brakes to the motor would still hold.

It is wholly unnecessary, then, to float around in a sea of uncertainty, with a view to designing competent brakes for motor cars. Determine first, the ability of the motor, and thereafter design the brakes on a basis of equality. If the clutch will serve to transmit the power necessary to drive the car, just such another clutch will serve to stop it. It will stop in a shorter distance than the distance of acceleration because it would stop unaided by any brakes at all were the power cut off.

Clutches and Brakes Compared

The very clutch, on which so much time is spent, is the exact device that will serve perfectly for brakes. The earnest attempts made to give life to clutches are wanted in connection with brakes. The reasoning for the one is good for the other, and any reasoning that is a fallacy for clutches is a fallacy for brakes. The argument in favor of brakes on the rear wheels to avoid shock to the transmission is weak, unless it is an admission that the same transmission is damaged by the clutch. If the clutch will hold while the motor slips the wheels, the brakes can do no more. If the brakes would unduly shock the transmission system, so would the clutch. The car that will not stand up with brakes on the propeller-shaft will go to rack equally fast, because the clutch will furnish the very same destructive effect complained of in connection with the brakes.

The clutch is operated with great frequency, whereas the brakes are used to stop a car, or to frequently slow down, if the driver is more or less incompetent. At all events, it is the clutch as a rule that will do the most damage to a weak car, not forgetting that the motor is the prime source of the power. With a view to showing what it means to have the brakes on the traction wheels instead of upon the propeller-shaft, or some other shaft back of the clutch, rotating at a speed higher than the traction wheels, a concrete example may be set down as follows:

Assume a 12-inch brake drum under two sets of conditions as follows: 1, On the propeller-shaft making four times as many revolutions per minute as the rear wheels; 2, on the rear wheels at one-fourth the speed of that of the propeller-shaft.

Pull in pounds on the periphery of the drum in a given case will be equal to:

$$P = \frac{H.P. \times 33{,}000 \times Q}{2 \pi R S}$$

When:

P = pull in pounds on the periphery of the drum;
H.P. = the actual delivered horsepower of the motor;
Q = the efficiency of the transmission;
R = radius of the drum in feet.
S = angular velocity in revolutions per minute.

For a case involving a 25-horsepower motor at 1,500 revolutions per minute we have:

Case One

$$P = \frac{25 \times 33{,}000 \times .70}{6.28 \times .5 \times 1{,}500} = 122 +$$

Case Two

$$P = \frac{12.5 \times 33{,}000 \times .70}{6.28 \times .5 \times 375} \times 2 = 490$$

In other words, a brake system on the higher speed shaft will balance the ability of the motor under the conditions named, if a pull is exerted equal to about 122 pounds on a drum 12 inches in diameter. If the two drums are used on the rear wheels, assuming an equal division of work, the pull on the main rod will have to be four times the pull for case one, because the speed is one-fourth and all the remaining conditions are equal in both cases. Back of the compensating device the effort will be divided by two, and the pull on the respective traction wheel drums will then be 244 pounds approximately, for the case in hand. If the pull on the periphery of the high speed brake drum is all that can be afforded, then it is plain that the greater pull required on the traction wheel drums will not be available. If the pull required for the lower speed —traction wheel—drums can be allowed, the problem resolves itself into the question of the relative virtues of speed versus pull.

Relative Virtues of Speed and Power

The effectiveness would be proportional to pressure on the periphery, on the one hand, and to speed upon the other were the coefficient of friction to remain constant for all speeds of slipping, and for all materials, which is not the case. On the other hand, the higher the speed the quicker the action for any material that will prove efficient as the speed increases. In these points we have the reasons for successes in some cases, and failures in others.

Designers who do succeed consider the abilities of the materials they use, under the conditions of use. Some fail through imitating designs that work, as respects materials, but not under the same conditions, as respects pressure and speed of rubbing.

The abstract coefficient of friction as determined in a laboratory is as far from the true facts in practice, as it is possible to go. If the materials are pulled over the face of a platen at a low speed, under a given load, for a given area of bearing, the respective materials will perform in proportion to their respective abilities to cling to the platen surface. The coefficient so obtained affords no clew as to the effect of speed, although it is possible to plot a curve for pressure by the simple expedient of changing the weight for a given area. These coefficients are good, as far as they go, but they do not go far enough to serve the purpose sought, with the result that brakes work, or they do not, merely depending upon the speed of rubbing when pressure is applied for any given material. It makes no difference what the material is, since there is no single genera of material of which we have knowledge that will work under conditions of a constant coefficient of friction, under all conditions of speed.

Composite Shoes Required

The conditions in practice require the use of two classes of material in the shoes, as follows:

A, A material that will "bite" upon contact at high rubbing velocities; B, a material that will supplant the high-speed clinging material when the speed falls off, and pressure must be increased to continue the effort to a successful climax.

Some 6 or 7 years ago, when cork was at first considered seriously for

clutches, Mr. Fay, then executive engineer for the C. W. Hunt Co., decided that cork—if it was good for the purpose—might be used exclusively and instead of an insert, made shoes of pressed cork, and tried them out under very exacting conditions of service. The experiment was an indifferent success for the good reason that unsupported cork "crawled" out from under the pressure. It took time to unravel the mystery, and it was ultimately ascertained that too much cork was worse than none at all. Brakes must have shoes that stand up to the pressure, because the mechanism is so closely linked that an excessive increase in the length of the band results in exhausting the travel of the linkage. If a drum, say 12 inches in diameter, is lined with a material that compresses $\frac{1}{16}$ inch the condition will be as follows:

$3.1416 \times 12 = 37.6992$ inches cir.

$3.1416 \times 11\frac{7}{8} = 37.3065$ or .3927 inch difference.

This increase if .392 inches in the length of the band, is more than the take-up will allow in addition to the normal clearance, and the band will then not constrict adequately for the purpose. Increasing diameters of drums increases the trouble, since the length of the band is equal to:

$2\pi R = \pi D$

when R and D = radius and diameter respectively.

Why All Cork Failed

It is easy to see why all cork failed in service. It fell away from the pressure and the take-up reached the limits of available effective sweep. Beyond this point lies an unbroken series of reasons why the cork should be used as an insert, as for illustration:

A, The cork is not a good conductor of heat, and if it is inserted in metal, the heat will be spread out over the metal surfaces and be radiated from the cork as a result. The cork then will get no hotter than the metal;

B, the cork will grab at a high speed, and will snub motion—relative—up to the limit of its ability;

C, when the pressure conquers the rigidity of cork, the inserts will compress in their sockets, without loss of ability up to its limit, since it will contact just the same—not unlike a compressed spring—and present about the same face area as before it is "flushed";

D, when the metal faces contact, they do so under high pressure, and lowered speed, hence under effective conditions for metal, and it will then grab on as well and render assistance to the receding corks. In these phenomena, we see the reasons why a dual condition of the brake shoe medium will best serve the ends to be sought.

Wipe the Heat From the Surfaces

In motors, to keep them cool, we arrange to wipe the heat off of the hot surfaces and we use a liquid for the purpose, as water, or, glycerine and water, etc. The specific heat of the liquid is brought into play and by keeping the liquid churned, or circulating, we bring cool splashes of the liquid up to replace the heat-ladened portions fast enough to absorb all the heat and maintain a constant temperature. If we can wipe the heat off of the hot surfaces of the motor cylinder head, we can duplicate the process in connection with the brakes. We did not think it so easy without resorting to waterjackets, and most of us refuse to add to the freezing zones. Oil did not seem to lend itself to the process, since, in the past, the problem was to keep oil away from brake shoe surfaces, but clutches submerged in oil do work. So will brakes. They will work in conjunction with cork inserts on a moderate pressure, or, they will work anyway if the pressure is high enough to drive the oil out from between the faces and let the metals contact. It is best to avoid these high pressures if we can, and if cork is the product that will wipe the oil off of the faces—just as a rubber mop wipes water off of plate glass—and allow of a friction contact, cork has a property that lends itself nobly to the task to be performed.

Coefficient of Friction On Cork

The coefficient of friction of cork on oiled faces is higher than that of leather, as it is ordinarily found in cone clutches. It is high enough then to assure working qualities under pressure and low enough to abort structural impossibilities. The oil bath will serve to wipe away the heat and distribute it over the radiating surfaces of the housing. The one remaining factor is that of providing enough surface to dispel the heat. The emissivity of roughened black surfaces, as iron housings, for oil baths, with the car in motion, as will be the case with brakes on cars, may be set down as at the rate of 10 watts per square inch, within the allowable increase in temperature for the materials used. The surface then to radiate the heat must be sufficient to dissipate energy at a rate equal to snubbing a car on a grade, for some time, and taking the electrical equivalent of a horsepower, a means is at once afforded for fixing upon the requisite surface.

Some Figuring

The simple process of stopping a car does not involve this problem, since the body of oil in the bath would have to be heated, and that would have to be at the expense of time. In descending a grade, the speed of a car would probably be low—say 10 miles per hour—and with the clutch free, thus putting it up to the brakes. Assuming that the friction of the car would total 30 per cent, the weight would enter into the calculation as well as the speed and grade.

10 miles per hour = 880 feet per minute;

880/5 = 176 feet fall per minute;

= vertical drop per minute;

car weighs, say 3,000 pounds and a gradient of one in five,

$3{,}000 \times 176 = 528{,}000$ foot pounds;

from which take $30 \times 880 = 26{,}400$; leaves 501,600 foot pounds;

hence, $\frac{501{,}600}{33{,}000} = 15.2$ H. P.;

$15.2 \times .70 = 10.6$ H. P. to be dissipated in heat over the surfaces;

and $\frac{10.6 \times 746}{10} = 791$ square inches of—oil bath housing—surface required to dissipate the heat, on a basis of 10 watts per square inch. This is not impossible.

This is on a basis of a draw bar pull of 20 pounds per ton mile, which is a fair average figure, although some tests made some time ago showed 70 watts per 1,000 pounds—rate of expenditure—for a 3,000-pound car, would foot up to:

$70 \times 3 = 210$ watts;

$210 \times 10 = 2{,}100$;

$2{,}100/746 = 2.8$ H. P.;

$2.8 \times 33{,}000 = 92{,}400$ foot pounds per minute.

If the car—outside of the transmission losses—will retard on a basis of 92,400 pounds per minute, when doing 10 miles per hour instead of 26,400 foot pounds, then the surface of the drum housing will need be less. In this we have a factor of safety which may be allowed to stand.

Retarded by "Horizontal Component"

A car descending is retarded by the "horizontal component," and if the brakes are on the remote end of the transmission, by the "mechanical component."

The same car—motor cut off by the clutch—will be impelled by the "gravitational component." Since the brakes will be arbitrarily set to control the speed, the gravitational component will be equal to the energy of position residing in the car. In this case the car is said to drop—down grade—880 feet

$\frac{880}{5} = 176$ feet per minute. The energy of position is $176 \times 3{,}000 = 528{,}000$ foot pounds, from which the two negative components must be taken, leaving the energy that must be absorbed and dissipated by the brakes, which was found to be 10.6 horsepower, reduced to watts for convenience.

The pressure on a brake drum—pull in pounds at the periphery—would be, for the case in point:

$$P = \frac{10.6 \times 33{,}000}{6.28 \times .5 \times 452} = 246 \text{ pounds;}$$

and were the emergency brakes required to do the work, considering a four to one gear ratio, the pull on each one of them would be:

$246 \times 2 = 492$ pounds, considering all brakes as of 12 inches in diameter.

An Emergency Condition Portrayed

In that we see the greater need of brakes than would follow the previous condition in which the torque of the motor was taken as a guide, but a gradient of one to five is most unusual, and the double

set of brakes would about correct the discrepancy, were all the brakes of equal competence. There is one other way to take care of this condition, that is, place the emergency brakes on the clutchshaft and gear down so that the clutchshaft would be rotating at a considerably higher speed than that due to a direct drive. The losses in transmission would also help out. At all events it is possible to maintain the first contention, in which the 12-inch drum would have to sustain a peripheral pull of 122 pounds.

Ability Is Proportional

But the ability is proportional to the pull on the periphery, and the life is proportional to the contact area in square inches, for a given material and peripheral pull. If we allow that the projected area will equal the contact area, then for a drum of 12 inches in diameter, with shoes 2 inches wide, the projected area will be:

$$12 \times 2 = 24 \text{ square inches.}$$

If it is safe to work on a basis of 10 pounds per square inch,

$$24 \times 10 = 240 \text{ pounds;}$$

and since this pressure will be against the periphery, it will be resolved as a tangential effort and become the pull P in the formula

$$P = \frac{\text{H.P.} \times 33{,}000}{2 \pi R S} = \text{pull in pounds;}$$

when, R and S = radius in feet and speed in revolutions per minute respectively. The next question is, Will some other pressure per square inch be better? We will endeavor to answer this later by some illustrations and tests.

Illustrating the Point

If we assume that bronze on steel will be the basis from which to judge of relative values, it will be necessary to fix upon the coefficient of friction of the basic products first. This, for several pressure at low speeds will be as follows:

Pounds per square inch:				
2	4	6	8	10
Coefficient of friction:				
.14	.14	.14	.14	.14

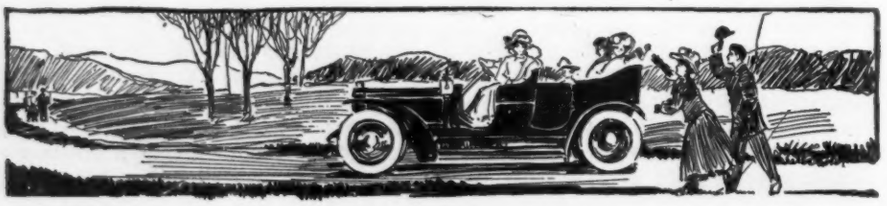
In other words the coefficient is constant up to the point of seizing. After this point is reached the friction follows no law.

If, on the other hand, 20 per cent of the bronze shoe surface is of cork—in the shape of inserts—using ¾-inch corks in sockets 1½ inches apart, center to center, the coefficient will be as follows:

Pounds per square inch:				
2	4	6	8	10
Coefficient of friction:				
.35	.35	.35	.327	.293

In this we see the increase in value for decreasing pressure with a direct proportion below 6 pounds per square inch, and at about 5 pounds per square inch the coefficient is at its maximum.

On the other hand, oil will not squeeze out—excepting under the cork, where it is mopped off—at such low pressures, and if the pressure is applied to an extent that will cause the cork to recede to the flush, the oil film on the metal-to-metal contact will defeat the further increase in clutching ability, provided the metal surface is the remaining 80 per cent, allowing 20 per cent for cork. The theoretically correct shoe, then, will present but little metal-to-metal surface and an easy channel for the oil to escape.



Standardizing of Motor Car Bearings

By S. P. Wetherill, Jr.

THE advantages and disadvantages of the general principle of standardization have no doubt been thoroughly threshed out by the members of the Society of Automobile Engineers to a point where anything which might be said regarding them here would be, if not entirely superfluous, at least but a repetition of acknowledged conditions.

The writer has, however, made quite a study of the conditions affecting the application of this desirable general principle to the specific cause of motor car connecting-rod and crankcase bearings, and will endeavor to show, not only that the time is ripe for definite action in this direction, but that actually quite a step toward the ultimate aim of a practical standard has already been taken, and that, by the action of the law of survival of the fittest, it is but a question of a reasonably short time when a definite standard bearing will be an accomplished fact.

In the following discussion, it is to be remembered that the writer's aim is not to claim his conclusion as infallible, but rather to state the facts as they appear to him, and to invite the criticism and comment of those members whose experience as users of bearings can throw additional light on the demands of the situation.

Three Essential Conditions

To begin with, there appear to be three essential conditions to be met:

1—A metal must be decided upon which, while inexpensive enough to hold its own with cheap babbitts for relatively light duty, is still of the highest quality obtainable to stand the maximum requirements of overloading.

2—The range of sizes must be wide and the variations by smallest possible steps so that the designer will never have to make serious sacrifices in order to avail himself of the standard.

3—The cost of the bearings must be such as to convince the intelligent manufacturer that he cannot afford to make his own bearings.

Truly a formidable set of conditions, as is well shown by the fact that hitherto none, to the writer's knowledge, have had the temerity to try to meet them.

Considering the conditions in the order named, the first and perhaps most vital question is that of selecting the metal best suited to stand up to all requirements. While doubtless some very interesting scientific data could be collected by an exhaustive set of laboratory tests, to determine the coefficient of friction, the rigidity under compression, the hardness, melting points and lubricating qualities of all the anti-friction metals on the market, such tests would be very tedious and expensive, and would not be really as indicative of the metal best suited to meet actual road conditions as would an investigation as to what material has given best results among the leading concerns. It is hardly to be expected that there would be absolute unanimity of opinion among the leading designers, but it is of the utmost importance that the metal selected be acknowledged to be the best obtainable.

Now let us consider the second condition to be met, namely, that of maximum range of size and minimum practicable variation between sizes. It will be seen that the demand must be met for split connecting-rod and crankcase bearings, and also for a great variety of whole round bushings, all having a wide range of variation as to diameter, length, thickness of wall, thickness of flange and flange diameters, while the various forms of oil grooves, dowels, lugs and champfers seem only to be limited by the number of designers multiplied by the number of different bearings they design. Discouraging as this may seem, it is not hopeless, as by fixing certain relatively minor details in accordance with the best accepted practice to date, it is possible to map out a series of about 300 sizes suitable for shaft diameters, progressing in increments of sixteenths of an inch, with lengths varying from a reasonable minimum to a reasonable maximum in increments of ⅛ of an inch, while wall thickness and flange dimensions vary proportionately. As for oil grooves, champfers, etc., these should be furnished either of a standard and generally acceptable design, or, perhaps better, left out altogether.

The inconveniences of machining up half-round bearings which meet around the shaft, are so serious that many well-thought-of concerns are keeping their costs

down by turning up round bearings and splitting them, which, of course, necessitates allowance for the saw thickness, and the spaces thus left must be filled with shims. This may have some advantages, but undoubtedly, were it not for the increased cost, the universal American practice would conform to the European standard, which demands that top and bottom halves of all split bearings should touch at the parting line; therefore, the ideal standards should embody this feature.

Further, before a bearing would be universally acceptable for high-grade work, it must have been rolled, peined or in some satisfactory manner treated to increase its density.

Now as to the all-important question of costs; this has been the principal stumbling block in the way of standardization. The prospect of sand casting, hammering and machining accurately a series of over 300 different designs of bearings of an expensive metal, with no definite means of knowing what exact sizes will be most popular, or how long they may have to be carried in stock, cannot be said to be very attractive to the ordinary manufacturer, particularly as, after all his trouble and expense, he would find his costs to be far above what the traffic would bear.

Die-Casting a Solution?

Many people looked upon the advent of the relatively recent art of die-casting as the solution of the problem. It was properly pointed out that, if accurate and satisfactory work could be done by this method, a set of standard dies could be accumulated and the problem would be solved, for there are probably no parts of a motor car to which the art of die-casting is more applicable than to the bearings. Already this matter has taken a conspicuous part among those whose requirements are sufficiently large to warrant investment in dies, for not only does die-casting eliminate all machine labor on bearings, it—without extra cost—permits of the use of designs which would require so much machine labor by ordinary methods as to be prohibitive from the point of view of costs. Not only does this method assure uniformity as to dimensions, once the dies are right, but recent developments have shown that the compressive strength of bearing metals treated in this way is increased, and that the density is increased from 5 to 10 per cent, while the coefficient of friction is in no way altered. This should give increased life to the bearing, and entirely do away with the superficial peining to which many bearings are still subjected. Furthermore, the casting of dowel lugs on the back of a half bearing presents no difficulties whatever for die-casting methods, whereas it is out of the question by machine methods. Again chipping in oil grooves, changes in shape, due to molecular rearrangement of machined sand castings and excessive scraping in, can all be overcome; castings split on the diameter are more easily made by die-casting than those with the conventional allowance for saw cuts, and further, the unbroken casting skin should give additional life to the bearing and permit of a glaze being readily formed. On the whole, it behooves the up-to-date engineer to consider the possibilities and advantages to be gained by intelligently modifying his designs so as to benefit to a maximum by the savings made possible by die-casting methods.

Many Unforeseen Difficulties

It is to be noted, however, that here, as is usual in the development of new processes, many unforeseen difficulties have arisen and many engineers are disappointed in die-castings in general, because of failures which were not due to fundamentally wrong principles, but rather to lack of knowledge and experience in the proper methods of handling metals by processes so radically different from sand foundry practice.

We cannot afford, however, to judge too hastily of the general principle of pressure casting because of a few specific failures, for those who have persisted in spite of early disappointment are now being liberally rewarded, as the remarkably high character of work now being done on a large commercial scale justifies the prediction, not only that die-casting has come to stay, but that in it lies the final solution of the standard bearing problem which faces the designers.

How To Secure Patents in Denmark

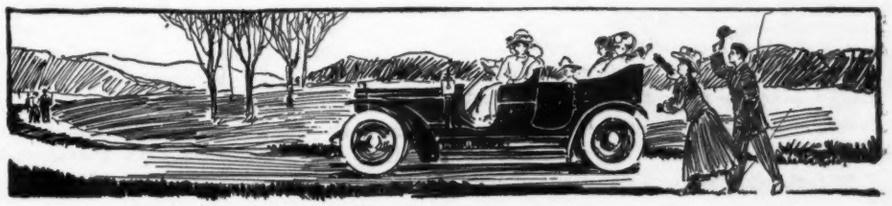
By H. G. Ward

THE patent law of Denmark is brief and to the point. It provides, among other things, that a patent can be obtained only by the inventor or his assignee. In the case of more than one application the preference is given to the first applicant. Every applicant for a patent not a resident of Denmark must appoint a resident representative. Inventions capable of being utilized in industry or capable of industrial exploitation are considered patentable inventions. Like many other European countries, the law of Denmark provides for three kinds of patents. The first is for patents of invention, the duration of which is 15 years, dating from the date of issue. The second classification is for "dependent patents," for improvements made on inventions patented by a person other than the applicant. The duration of this class of patents is also 15 years. "Patents of addition" comprise the third class, and they expire with the principal patent.

The filing tax is $5.36, while the fee for issuing a patent is $2.68. The annual taxes are as follows: The first 3 years, $6.70 each; the following 3, $13.40 each; the following 3, $26.80 each; the following 3, $53.60 each; the last 3 years, $80.40 each. Applications for a patent must be addressed to the patent commission, at Copenhagen, and must be in duplicate. Together with the application must be filed a description of the invention, which must also be in duplicate. When it is necessary for understanding the description, a drawing, in duplicate, is required, and, according to circumstances, a model, sample, etc. When the applicant is not a resident of Denmark, he must file, in addition to the above papers, a statement showing the appointment of a general representative residing in Denmark, which must be accompanied by the acceptance of the representative. The application, on stamped paper, must indicate the name, profession, and the residence of the applicant, as well as the title of the invention. It must indicate the name of the inventor, and, if it is filed by another, contain proof of the assignment. The description must be sufficiently complete to permit the invention to be carried out. It must indicate exactly what constitutes the claims of the invention. The application and the description must be on paper of official size.

One of the copies of the drawings must be on white cardboard of 33 centimeters in height by 21, 42, or 63 in width. All the figures and writings of the drawing must be executed in India ink, in very black and clear lines, without colors, within a line traced at 2 centimeters from the edge, a clear space of 3 centimeters being left at the top. The signature must be placed in the lower right-hand corner. The second copy must be a tracing on muslin. All documents must be in Danish.

The grant is as follows: Preliminary examination as to formalities prescribed and as to the patentability of the invention; publication of the application will call for opposition. The time allowed for opposition is 8 weeks. In case of rejection the applicant may appeal to the patent commission itself, afterward to a special commission to be appointed by the minister of the interior. Patented inventions must be worked in Denmark within 3 years from the date of the patent and must not be discontinued for more than 1 year.



The Readers' Clearing House

TEN QUESTIONS ON MOTORS

BLUE CANON, CAL.—Editor Motor Age—Answers by one of your readers are greatly desired for the following questions. As they are of universal interest, kindly insert them in the Readers' Clearing House columns. First—Is not some degree of offset of the crankshaft absolutely necessary in the most efficient type of spherical combustion chamber wherein the most rapid rate of flame propagation throughout the mass of combustible material is obtained over the usual type of chamber containing pockets for valves, the offset to allow a more rapid point of give to the tremendous force of quick combustion or near approach to an explosion? Second—Does not the use of a new explosive like acetylene gas absolutely require the offset crankshaft? Third—Is there a standard type of internal combustion motor for motor car propulsion using two spark plugs at different points in the cylinder and both firing simultaneously? I do not refer to dual ignition, where one set of storage and dry cells are used for starting and then switched to magneto, but the type where both independent systems of ignition are used continuously, firing the combustible charge at two points in the cylinder, thus increasing the rate of combustion. Fourth—Does not the auxiliary exhaust valve as applied to the Franklin air-cooled motor, if applied to the usual standard type of water-cooled, reduce the amount of heat given off to the water-jacket, and thus reduce the amount of water carried? Fifth—What reliable manufacturers sell the much-talked of addition to the future ignition field, the magnetic plug, and what motor car manufacturers use it, foreign or domestic, as part of their equipment? Sixth—In the opinion of Motor Age, what is the magnetic plug's status in the future field? Seventh—For what fundamental reason is the make-and-break system of ignition superior to the jump spark in the handling of lower grades of fuel and gasoline? This is one of their chief recommendations, I believe. Eighth—Give your opinion of your favorite system of motor lubrication for high powered six-cylinder cars. Does not the Marmon system nearly represent the system most successfully used by foreign manufacturers in road and track events? Ninth—Does any standard make of change-speed gear use three speeds forward and one reverse with usual drive on the second, direct drive on second, and approximately direct on third? Tenth—Kindly give the address of the firm manufacturing the Silent Knight motor.—W. R. Harlan.

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems and invites a discussion of pertinent subjects. Correspondence is solicited from subscribers and others.

Motor Age asks for expressions of opinion from manufacturers of cars and owners relative to experiences and experiments made with the off-set crankshaft and will be glad to publish in these columns reports of same. Regarding the manufacture of a standard internal combustion motor using two sparks at different points, the use of the double system, on which Elmer Apperson holds patents, allows of having two sparks occur simultaneously in each cylinder. The position of these sparks depends on the manufacturer; in some cases they are both over the intake valve, and in others one is over the intake and the other over the exhaust. There is a rumor at present to the effect that a foreign builder has a motor with five points of ignition in each combustion chamber. It has been noted by experiment that where two sparks take place at the same time at different points in a combustion chamber the ignition is quicker and the motor shows greater efficiency. If the two sparks take place practically at the same point the increase in efficiency is not so conspicuous. Concerning the auxiliary exhaust, it could be applied to any water-cooled car and if so applied the amount of heat having to be carried off by the water will be reduced and there is no reason why the quantity of water carried could not be reduced also. The magnetic plug is fitted for 1909 on Studebaker cars as regular equipment. This plug has had considerable use on Mercedes cars in Germany and several other foreign makes. Not a few private individuals driving foreign cars have used it during the past year and report entire satisfaction. The great value of the make-and-break system of ignition is the larger spark as compared with the jump-spark system, and the certainty of it igniting mixtures of varied constituencies. Concerning lubricating systems for six-cylinder cars there are several on the market at the present time giving entire satisfaction and it is largely a question of design as to which is the better, one maker getting better results from one system while another achieves equally good results from another system. It would be utterly impossible to state which is the best, because a system which is best in the hands of one manufacturer does not prove best in the hands of another. Motor Age has no knowledge of a three-speed gearset with direct on the second and approximately direct on the third, although there are makers using direct on both second and third speeds. The Silent Knight motor is being manufactured abroad by the Daimler Motor Co., Ltd., Coventry, England. The American headquarters are Knight & Kilbourne, 1238 Michigan avenue, Chicago.

OILING OPPOSED MOTORS

Chicago—Editor Motor Age—I note in the January 21 issue of Motor Age a letter regarding the merits of two and four-cylinder engines up to 20-horsepower, in which it is stated that the four-cylinder motor with vertical cylinders is easier to lubricate than the two-cylinder type with horizontal cylinders, and which also said that on account of the more constant torque which the four-cylinder motor has, it is much better than the two. I beg to take this opportunity to give my opinions in regard to this, which I am convinced are correct: In regard to lubricating, I would say that the two-cylinder motor is equally well, if not better, lubricated than the four, as the oil is admitted on the upper part of the piston and thrown around the entire piston; so clean, new oil is constantly surrounding the piston. The only way this can be done with a four-cylinder motor is to have a ring made which the lower end of the piston dips into, the up stroke carrying up this film of new oil. Any oiling system which depends entirely on the splash or the pump system which circulates the crankcase oil over and over, I consider bad, as this old oil is bound to contain very minute particles of metal, owing to the wear which takes place, and which, undoubtedly, does take place, and which wear is nothing more than the removing of the small particles of crankshaft or bearing surfaces. These particles are mixed in the oil and it stands to reason that a pure, clean oil is a better lubricant than using this old oil again. I would make the statement that properly built two-cylinder motors are better in practically every particular for motor cars under 20-horsepower, and were it possible to make a mechanical job and get more than 20-horsepower in a two-cylinder double-opposed motor under the bonnet, Maxwell and Briscoe would never have resorted to four. Over 20 horsepower, the cylinders become so large and the flywheel so heavy that it is a mechanical impossibility to make a satisfactory motor and locate it under the hood. Two-cylinder Maxwell engines have these advantages over the four: They are very much simpler, having about half as many moving parts, and they are much more accessible; the connecting rods, wrist pins and main bearings can all be tightened up without the necessity of taking down the motor; the main bearings could even be adjusted with the motor running were it necessary, as they are made on the loco-

motive pattern with a wedge block so all that is necessary to do is to take up on a set screw. They have no more vibration than four or six cylinders, being just exactly as perfectly balanced; they are less liable to trouble on account of the fewer parts; they use less electrical current on account of having to fire but two cylinders, and the power being the same, they would pull equally well with the four. The difference in torque amounts to nothing so long as the bearings and crankshaft are made correctly and the flywheel is of the right weight. I would go so far as to say that no person unaccustomed to motoring can tell whether he is traveling in a two, four or six-cylinder car, supposing all to be properly made, traveling on the high gear at 6 miles per hour on Michigan avenue, judging by the difference in the vibration.—R. A. Creek.

INFORMATION ON WIRING

Kane, Pa.—Editor Motor Age—I have been an interested subscriber to Motor Age for 3 years, and in that time have been watching for articles in which I am more particularly interested, and not seeing anything on the subject, I write for information. I own a four-cylinder motor, with storage battery, magneto and four-unit coil on dash; the switch also is on the dash—not in front of the spark coil. Will Motor Age tell me the correct method of wiring, as it does not look to me as if it is wired properly? What difference is there, if any, between having the switch on the coil and on the dash? What advantage or disadvantage is there in having the switch placed on the coil?—E. C. Anderson.

The only advantage of having the switch on the front of the coil is convenience and a little less wiring. The wiring should be negative of battery to ground, positive to switch, switch to coil, and coil to timer for each coil.

THE DUAL IGNITION SYSTEM

La Porte, Ind.—Editor Motor Age—Will Motor Age state if it would be possible to use a high-tension magneto together with another ignition system consisting of a four-unit coil, separate timer and wiring, with one set of spark plugs? If so, what would be the wiring arrangement with respect to dash switch? Would it be practical and efficient to use two plugs in a T which should screw into the hole in which the ordinary plug is used? I desire to have two independent systems of ignition, but the four-cylinder engine has spark plugs on the side of the cylinders with valves in head and only one set of plugs can be inserted.—A. E. Lindgren.

The system which you contemplate by using a magneto for one and coils, battery, timer, etc., for the other to one set of spark plugs is quite feasible, but it will be necessary to use a dual secondary switch, which can be obtained from manufacturers of ignition supplies. This system known as the dual would be preferable to a complete double ignition system with the spark plugs set in "T's" as you suggest. Instead of setting the plugs in a T, Motor Age would suggest threading both into the cap over the intake valve, which can be done by mounting them at an angle of 45 degrees.

WIND SHIELD TROUBLES

Wilcox, Neb.—Editor Motor Age—Will Motor Age kindly state whether there is any preparation that can be put on glass wind shields to make them more transparent when driving in misty or rainy weather?—A. J. Batty.

A talk with several motormen on street cars, who are greatly bothered with the above conditions, and who have tried alcohol, kerosene, glycerine and various mixtures, inclines to the opinion that no satisfactory solution has been discovered for this difficulty. There is a contrivance on the market like a window washer's rubber which is pivoted at one end, and operated inside the car, which can be used to clear the glass from mist, water or snow, provided it is not frozen on the glass.

MAY BE IGNITION TROUBLE

Madison, S. D.—Editor Motor Age—In the issue of January 14 a motorist stated that his engine missed on high speeds, but ran perfectly on low and that he had tried everything to remedy the trouble, but to no avail. I had the same experience in my old two-cylinder car, and blamed the coil, the timer, the wiring, the valves, the batteries, and everything else in and out of the dictionary, and with no result. I finally found, however, that the missing was entirely in one cylinder. By slightly increasing the distance between the spark plug points, thus producing a better spark, I remedied the trouble entirely. Most all instructions say the points should be 1/32 to 1/64 of an inch apart, but I always obtain better results to have them a trifle less than 1/16, say 1/24. A battery that is so weak that it will not produce a good spark with the points 1/16 apart, is mighty poor company anyway, I think.—H. H. Frudenfeld.

OTHERS AFTER CHAMPIONSHIP

Bushton, Kan.—Editor Motor Age—I have seen several communications the last year from different correspondents, bragging about the number of motor cars owned in their different towns, etc. Now, if bragging is in vogue, we will do a little of it ourselves. Bushton, Rice county, Kansas, a village of 250 inhabitants, has twelve motor cars, owned by individual owners, and used by them for business and pleasure. This does not take into account the machines on the floors of the two salesrooms. That is not all the story either. For the 10 months ending January 1, the bank had handled money from sales made by the three agents in town of over $80,000, and the largest part of this had been sales made to farmers. Now there is a reason for all this, and the answer is that Kansas has been doing well financially the last few years and we have the finest natural roads in the world. We have a motor car for every twenty-one people in the town, and not one owned by a person who cannot afford it either. We claim the distinction of owning the greatest number of motor cars per capita of any city or town in the United States of America.—Fred L. Willard.

Ohiowa, Neb.—Editor Motor Age—In Motor Age January 7, 1909, I see that Hooper, Neb., claims the largest number of motor cars for the population. Ohiowa, Neb., with a population less than 400, has eleven machines, all of which are in the corporation limits of the village. This makes an average of one car for every thirty-six of the population, according to my figuring.—Howard C. Harvey.

Haddam, Neb.—Editor Motor Age—I notice an article in your pages stating that a town in Nebraska had one motor car to every seventy per capita. Our little city of Haddam can beat that a little for, according to actual count, we have about 400 population, and have twelve motor cars, or one motor car to every 33 1/3 per capita.—Reader.

WINTER CARE OF BATTERIES

Chicago—Editor Motor Age—Will Motor Age kindly advise whether the solution contained in Fulmen storage batteries would freeze if the car were kept in a building where the temperature sometimes registers below zero? Is it necessary to take these batteries in where the temperature is above freezing?—Subscriber.

The battery liquid will not freeze at zero temperature, but it is advisable not to expose them too long under such conditions. If the car is laid up for the winter, remove the battery and keep it in a room of medium temperature.

LENGTHENING WHEELBASE

Chicago—Editor Motor Age—Will Motor Age kindly state advisability of lengthening the wheelbase on my touring car 8 inches to bring the front axle under the radiator in the following manner: Cut off the frame under the radiator, as near the front as possible, just where the bend begins to turn down to the spring; make a Vanadium steel casting of necessary length forward and back, the exact shape of frame and have it fitted into the frame where it is cut snugly, and extended back 8 or 10 inches for good riveting. Does Motor Age consider this job practical and would castings of that nature be strong enough? Would a job of that kind be a safe proposition?—J. H. R.

The method suggested is not the best by any means, as the part of the frame of which you speak has to carry the motor load and should not be weakened. A better method would be to cut the side members as near the rear as possible and add a piece, by inserting a length of channel section within the side piece and

riveting to this. The front axle can be advanced 4 or 5 inches by offsetting the front springs on the axle, so that the part of the spring in front of the axle is shorter than that in the rear of it. This would in all probability demand new springs. The angle of the steering knuckles should be changed if the wheelbase is lengthened in order to avoid undue wear on the front tires.

THE OFFSET CRANKSHAFT

Britton, S. D.—Editor Motor Age—The Rambler manufacturers are making a great deal of noise about their offset crank. I cannot see any advantage, and their claims would seem more a source of danger to the crankshaft than an advantage to power. I cannot see that the offset is much more than a retarded spark in effect.—E. A. Cooper.

The offset crankshaft has been adopted by several internal combustion motor manufacturers, and its effect is to reduce the angularity of the connecting rod on the explosion stroke, thereby lessening the side thrust of the piston on the cylinder on this stroke with the result of a gain in power. On the compression and exhaust stroke the angularity of the connecting rod is greater than normal.

ALCOHOL EFFECT ON RUBBER

Yankton, S. D.—Editor Motor Age—Wil Motor Age, inform me, through the Readers' Clearing House, what effect a 50 percent solution of denatured alcohol and water would have on the metal and rubber in the cooling system of my Reo touring car? At what degree below zero would it freeze?—C. P. Edmunds.

This subject is fully explained in these columns, October 15, page 26, under the head "Alcohol Prevents Freezing," to which you are referred.

PRAISE FOR G. B. SELDEN

Oshkosh, Wis.—Editor Motor Age—It may be somewhat amusing to those who are not in position to know how or when George B. Selden, who owns the basic patent on motor cars as usually constructed, spent his last dollar in experimenting for the benefit of us all, to ridicule and criticise him and his claims, but here's what I know about it. In 1878, I was familiar with his experiments and knew him personally. In 1865 I rode in a steam-driven buggy, which was built by S. H. Roper—the caloric, or as he then termed it, the hot air engine—in Boston, Mass. This was of the piano box buggy type. The boiler was circular, upright and hung on two braces which extended to the rear of the box. The engine was under the body. This Roper raced his steam buggy against a trotting horse on the Island trotting course between Troy and Albany, N. Y., and the car came in ahead. From my ride in the Roper in 1865, I was a convert to the buggy type of motor cars. Selden's was of the high, 38-inch wheel type. In 1905 I assisted materially in mounting the engine Selden had made in 1877 and 1878 at Rochester, N. Y. Selden appears to be entirely indifferent to public opinion regarding his invention, as indeed he may well be now, but if those who are most severe in their ridicule had seen or known how this inventor worked, studied, and denied himself of comforts as he did years ago, they would feel as I do that Selden is fully entitled to all the praise for seeing so far ahead of the period when he was alone in America working on the development of what is today the leading industry of the country. Claiming to believe in the future of the high-wheel motor car, I say, all praise to George B. Selden, the inventor.—C. B. Hatfield.

CONCERNING PICRIC ACID

Decatur, Ill.—Editor Motor Age—Through the Readers' Clearing House will Motor Age describe the experiment spoken of in an issue of Motor Age concerning picric acid as mixed with gasoline for fuel on gasoline cars? Where is the proper place for a selective transmission on a motor car chassis?—R. B. M.

It is impossible to state to which experiment with picric acid you refer. In fact, Motor Age has rarely published anything more in this connection than referring to cases where it has been used. The use of picric acid has been confined to fuel tests and speed trials. In one or two instances it has been used in hill-climbs and in economy contests to about the same extent. A claimed increase in speed and economy has accompanied its use, although there is the grave danger of injury to the cylinder castings and pistons which apparently has been overlooked by the parties using it. There is no definite place on a motor car chassis where a selective gearset should be used; in fact, the present design is divided into three groups, those placing it on the frame a short distance behind the motor, incorporating it as a unit with the motor and incorporating as a unit with the back axle. As to which of these is the most desired situation, that rests largely with the designer. One maker likes the unit crankcase and gearbox, another likes the gearbox and back axle, and the third prefers all three.

PRONUNCIATION OF MAGNETO

Irene, S. D.—Editor Motor Age—"While we cite but one dictionary to back us up, and there are, as we have shown, four at least with the accent on the first syllable, we still maintain that usage—overwhelming usage—makes măg-nē'-tō the correct pronunciation." The above is part of an answer to an inquiry in regard to the pronunciation of the word magneto. I do not intend asking you how you would pronounce the word, as it is far easier to consult a dictionary. That also saves you the trouble of answering such simple questions. But what I do wish to ask you is this: Taking into consideration the facts that the one dictionary, which is Murray's Oxford—and, by the way, this is a back number compared with any other and overwhelming usage is his only backing—taking into consideration, I say, these things, what is your honest opinion of an editor who would place anything like the above in his paper? Usage, whether overwhelming or otherwise, of words or anything else is no criterion of correctness. Of course, I am well aware of the fact that no dire calamity would likely befall our nation even if we do occasionally make the blunder of calling the word măg-nē'-tō, and that such blunders would probably not produce any remarkable effect upon the generations to come, but anyway, why not have something to back us up—something stable and solid—why not use the dictionary? What else is it for if not a guide in pronunciation, and why do our schools all over the land use it? Why not go by guess or by what we hear mostly, not taking into consideration whom we hear? It is quite necessary, I say, that we have some standard in such matters. Overwhelming usage doesn't always answer the purpose, but the dictionary does to perfection. It always has been our guide, and we cannot turn from such authority now, regardless of what we hear or how many we hear. It is true that dictionaries may be changed from time to time in accordance with general usage, but until such change is made, let us make haste slowly about launching out and saying we are absolutely right because we have no authority, and others are wrong because they have authority for their statements.—C. A. McChesney.

The pronunciation given in Webster's international dictionary is măg-nēt'-o.

MUFFLER BACK PRESSURE

Hamilton, O.—Editor Motor Age—I have a gasoline-driven machine of four cylinders. Cylinders are 3¾ inches diameter by 3¾-inch stroke. Please advise me what the horsepower delivered to the end of the driving shaft is; also the method of figuring same; also what the back pressure would be in the muffler.—D. Hooven.

According to the A. L. A. M. horsepower formula, your motor should show 22.5 horsepower, which is arrived at as follows: Multiply the cylinder diameter, 3¾ inches by 3¾, then multiply by 4, which is the number of cylinders, and divide by 2.5. It is impossible to say how much back pressure the muffler will create, as that is a question of the muffler design and is not the same for any two makes of mufflers. The amount of back pressure from mufflers is frequently arrived at by counting the loss in crankshaft revolutions per minute. A motor is tested free and runs at 1,200 revolutions per minute, and when a muffler is coupled up, with all other factors equal, its speed drops to 1,150 revolutions per minute, and the muffler has caused the loss of fifty revolutions per minute.

Brief Business Announcements

Des Moines, Ia.—Grover Hubbell has been appointed local agent for the Locomotive.

Wilmington, Del.—George L. Townsend has been elected secretary of the Bradford Automobile Co.

St. Louis, Mo.—The Doyle Motor Car Co. has been appointed local agent for the Frayer-Miller.

New York—The Bosch Magneto Co. is to remove to its new building at 223-225 West Forty-sixth street.

New York—The Speedwell Motor Car Co. has leased for a term of years the store and basement at 2002 Broadway.

Newark, N. J.—The Welden-Bauer Co., agent for the National, also has been appointed representative for the Mitchell.

Easton, Pa.—J. Ernest Smith, who has been running the Holland garage at Third and Lehigh streets, will go out of business.

Philadelphia, Pa.—The North Philadelphia Auto Station, of 3425 North Broad street, has been appointed local agent for the Knox.

Birmingham, Ala.—The Kelley Automobile Co. has been appointed agent for the Buick. The company is planning to establish a new garage.

St. Louis, Mo.—Felin R. Claudet, who was appointed agent for the Oakland a short time ago, has located his headquarters at 3914 Washington avenue.

Albany, N. Y.—The White Plains Auto Exchange, of White Plains, has been incorporated with a capital stock of $1,000. One of the incorporators is L. W. Haight.

Albany, N. Y.—The Juruick Auto Co., of Brooklyn, has been incorporated with a capital stock of $5,000. The incorporators are M. F. Juruick, L. R. Smith and Anne Juruick.

Utica, N. Y.—The L. L. Laman Auto Top Co. has consolidated with the Iroquois Auto Top Co., and in the future will do business under the name of the Iroquois company.

St. Louis, Mo.—J. H. Phillips, who has been acting as vice-president of the Mississippi Valley Automobile Co., has resigned his position and is no longer connected with the concern.

Albany, N. Y.—The Dillard Delivery Co., of Brooklyn, has been incorporated with a capital stock of $2,000, and will manufacture wagons, carriages, motor cars, and deal in horses, mules, etc. The incorporators are J. A. Dillard, H. B. Lyons and O. F. Fix.

Flushing, L. I.—It is rumored that the General Electric Co. is about to start a factory for the manufacture of electric vehicles, etc. Surveyors are now at work and as soon as the surveys are completed, it is said, that the deeds will be signed, as all negotiations are completed.

New York—Carlton R. Mabley, formerly connected with the firm of Smith & Mabley, has been appointed general manager of the Penn Motor Co., local agent for the Hart-Kraft delivery wagon.

Los Angeles, Cal.—The Needles-Parker Transportation Co. has established a bus line between Needles and Parker, which will maintain a regular schedule in conjunction with the Santa Fe railway.

San Francisco, Cal.—J. W. Leavitt & Co., agents for the Reo, Stoddard-Dayton and other cars, has leased the building at Golden Gate avenue and Hyde street, and will locate their headquarters there.

Los Angeles, Cal.—The Elmore Motor Car Co. has taken the agency for the Baker electric. E. L. Brown, formerly with the Electrical Construction Co., is to look after the interests of the car.

Louisville, Ky.—The Louisville Automobile Dealers' Association has been organized with the following officers: President, Prince Wells; vice-president, E. G. Reimers; secretary-treasurer, Hurburt Levy.

Los Angeles, Cal.—The W. D. Newerf Rubber Co., which has been acting as agent for the Goodyear company on the Pacific coast, has completed arrangements to represent this company in British Columbia, Oregon, Washington, Idaho, Nevada, Arizona, Mexico and the Hawaiian Islands. In addition to having large stores in Los Angeles and San Francisco, branches will be established in Vancouver, B. C., Seattle, Spokane Falls, Pasadena, City of Mexico and Honolulu.

Niagara Falls, N. Y.—Tourist Auto Car Co.; capital stock $10,000; to operate and rent motor cars; incorporators, J. H. Bridges, E. M. Wheeler and S. C. Fugard.

Buffalo, N. Y.—American Auto Heater Co.; capital stock $5,600; to manufacture heaters for motor cars, motor boats, etc.; incorporators, G. E. Fillmore, F. D. Bailey and J. K. Aitken.

Jefferson City, Mo.—C. & O. Automobile Co.; capital stock $6,000; to rent motor cars; incorporators, C. H. Duffer, E. E. Reuter.

Memphis, Tenn.—Memphis Taxicab Co. of Shelby County; capital stock $25,000; incorporators, F. Farrell, R. H. Allen, W. S. Watson.

Chicago—Motor Appliances Co.; capital stock $2,500; to manufacture motor cars and appliances; incorporators, J. W. Lindgren, E. H. Tillson and A. L. Ringo.

Winchester, Mass.—Winchester Automobile Co.; capital stock $10,000; to do a general motor car business; incorporators, C. E. Tedford, of Boston, who is the president, and George O. Fogg, of Winchester, treasurer.

Oklahoma City, Okla.—Overland Automobile Sales Co.; capital stock $10,000; incorporators, Jerome Harrington, W. G. Brown and A. E. Funk.

New York—P. & H. Taxi Co.; capital stock $5,000; to rent cars; incorporators, A. Present, E. C. Hyman.

Connersville, Ind.—The Central Mfg. Co., which has been manufacturing wooden bodies, has started work on the erection of a new building, which will be devoted to the making of metal bodies for motor cars.

Harrisburg, Pa.—J. L. Shearer, Jr., who is one of the prime movers in the taxicab company which was recently formed in this city, is also interested in a similar concern which has been organized in Pittsburg.

Pittsburg, Pa.—The Banker Brothers Co. has been reorganized, but will continue to do business under the same name. The company has the agency for the Pierce-Arrow, Stevens-Duryea and Chalmers-Detroit.

Springfield, Ill.—The Speedwell Motor Car Co., of Chicago, has been incorporated with a capital stock of $30,000, and will manufacture and deal in cars. The incorporators are Robert Patterson, T. F. Smith and E. D. Gibbs.

Austin, Tex.—Permission has been granted to the Overland Automobile Sales Co., of Oklahoma City, Okla., to do business in this state. The company has a capital stock of $10,000, and will have its principal office in Dallas.

Philadelphia, Pa.—The partnership between John J. Hill and John J. Holmes, who have been trading as Hill & Holmes, and also as the Glenwood garage, has been dissolved, and Holmes will carry on the business himself in future.

Pendleton, Ore.—The Pendleton Auto Co. will shortly be installed in its new garage. This concern has the local agencies for the E.-M.-F. and the Studebaker, in addition to the Franklin, for which it has been agent for some time.

Danville, Ill.—D. D. Snyder & Co., carriage dealers on West Main street, have decided to add a motor car department to their business. They have arranged a special room for the repainting of cars, and will also make and trim tops.

Albany, N. Y.—The Marathon Automobile and Garage Co., of New York city, has been incorporated with a capital stock of $1,000, and will do a garage and storage business. The incorporators are R. G. Berille, W. C. Wyckoff and P. G. Chedbum.

Hartford, Conn.—The New Haven Taxicab Co., of New Haven, has been incorporated with a capital stock of $25,000, by George G., Peter C. and Robert G. Nesbit. The company already has two cabs in service and expects to add others by degrees.

Recent Motor Car Development

MOON cars for this season are being built in two chassis sizes, both alike in every respect except wheelbase, wheel sizes and constructive strength. Of these model C with 110-inch wheelbase is made for bodies with five-passenger touring car, roadster and toy tonneau styles and model D with 121-inch wheelbase carries a seven-passenger body. The Moon chassis differs but in minor details from that design placed on the market a couple of seasons ago, the design of that time having proved satisfactory except for those alterations which the progress of two seasons has brought about.

This car has many characteristics, and in fact is far from the accepted line of conventionality which pervades so many of the medium-priced machines of the present season. To begin, the Moon valve action includes the overhead camshaft with intake and exhaust valves in the cylinder heads and but one rocker arm to open the intake and exhaust valve on each cylinder. Close on top of this unconventionality comes the use of a vertical shaft at the forward end of the motor which through bevel gears drives the camshaft from the end of the crankshaft; and in addition drives the magneto on the right front through bevel gears and the water pump at the left front through horizontal spur gears; the total arrangement being particularly compact yet leaving both the water pump and magneto accessible in every respect. Still further is the symmetrical motor layout with carbureter on the right and nothing opposite but exhaust and water piping.

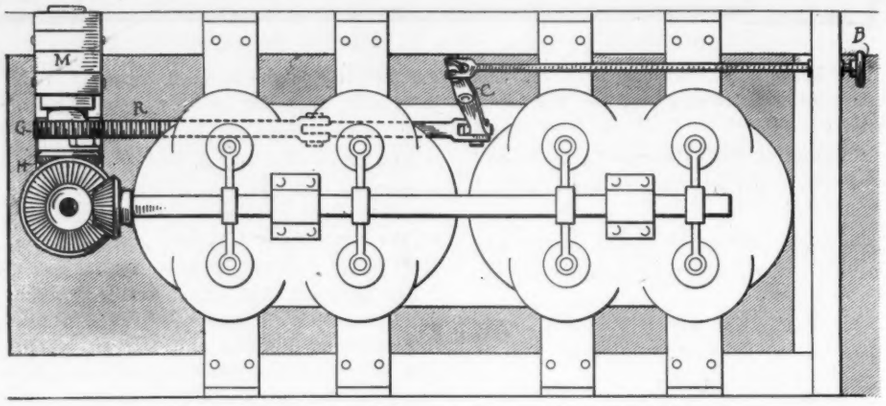
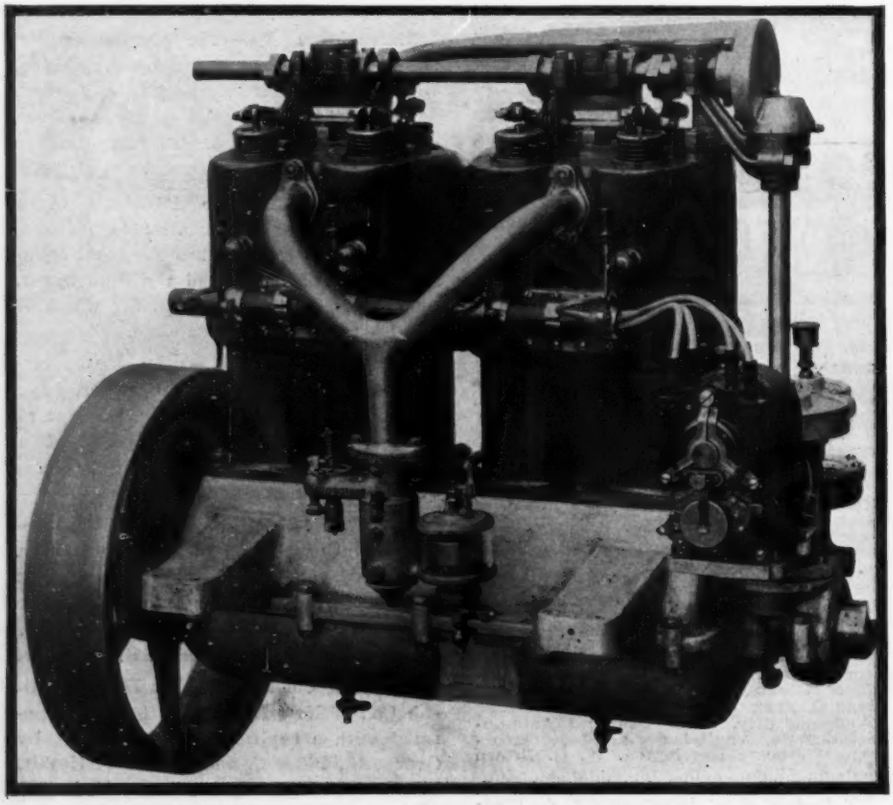


FIG. 1—DIAGRAM OF SCHEME USED IN MOON SELF-STARTER

Structurally viewed, the motor follows that accepted line of design in which twin castings with integral parts are used, the two-cylinder castings having support on an aluminum crankcase made in upper and lower halves, the upper supporting the three crankshaft bearings and having integral arms reposing on the sub-frame members for support. The usual half-time gears are not required, but the gears for driving the vertical shaft at the front end at bottom and top are enclosed and special provisions for the lubrication of them made. A fan is not used in the cooling scheme, but recourse is had to the flywheel spokes made as blades of a propeller, and offering particularly good cooling facilities owing to the small diameter of the hub housing containing the multiple-disk clutch. Every care has been taken to secure ample water spaces around the exhaust valve cages in the cylinder heads and to accomplish which slight offsets or pockets are made in the castings at this point, this permitting of large-diameter valves as well as adequate cooling facilities.

The water system groups on the left side as delineated in the motor illustration on the next page, the short elbow pipe from the pump connecting by hose with the radiator and delivering through a T piece to the jackets beneath the exhaust valves. The return pipe, from the jackets to the radiator, connects with the jacket heads between the exhaust valve cages. Honeycomb radiators are used.

A novelty in the ignition system is the employment of but one current source, and the use of one set of plugs, but as an assistance for starting with only a magneto equipment a self-starting device is fitted and illustrated in Figs. 1 and 2. In brief, it consists of a mechanical arrangement whereby the armature-shaft is turned backward one-third revolution while the crankshaft of the motor remains stationary. While being so rotated backward a coil spring is wound and when the armature is released this spring spins the armature past a sparking point, which spark is delivered to the cylinder ready to fire. It is a purely mechanical arrangement worked from a button B, Fig. 1, which when pressed operates a rack R through a cross-arm C pushing the rack in one direction. The rack meshes with a gear G on the armature-shaft and sufficient pull is allowed to make a one-third rotation of the armature in its backward direction. When the button is released a clock spring contained in gear H, Fig. 2, begins unwinding and starts rotating the armature in its true direction. A catch or shoulder shown between gears G and H in Fig. 2 locks the armature in its proper timing relation to the crankshaft and it continues in obedience only to the rotation of the motor



MOON MOTOR WITH MAGNETO AND WIRING SCHEME

Chassis of Moon Cars for 1909

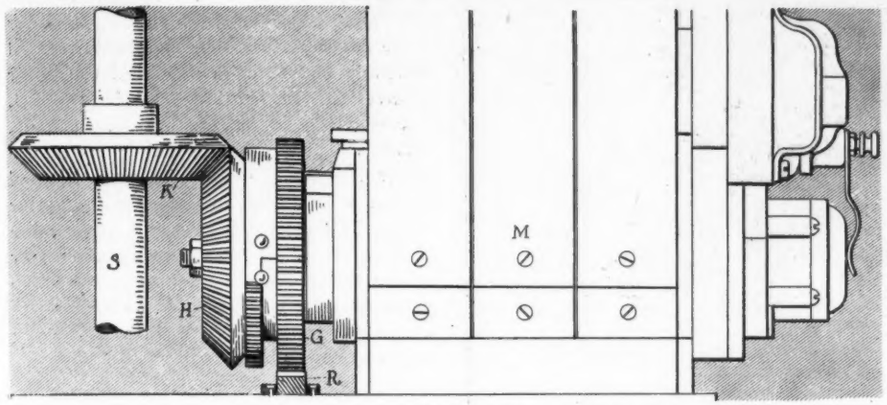


FIG. 2—DIAGRAM OF MOON'S MAGNETO STARTER

crankshaft. The spark plugs are located horizontally in the intake ports beneath the valves and the wires from the magneto to the plugs in addition to being supported in a tube on the cylinder sides connect with the spark plugs through knife-blade switches which permit of rapid testing of the cylinders or removal of a plug. Stationing the magneto transversely places the end with the breaker box and distributor outward where it is easy of access without getting near to hot pipes or other parts of the motor. Although the magneto and carbureter are on the same side, they are separated more than in the majority of cases where their location is on the same side of the motor.

Moon lubrication is of the multi-feed mechanical oiler type with an eight-feed oiler on the dash and driven from the end of the crankshaft. Of the eight feeds, three pass direct to the crankshaft bearings, four connect with the cylinders and one goes to the lower bearing of the vertical shaft at the front of the motor.

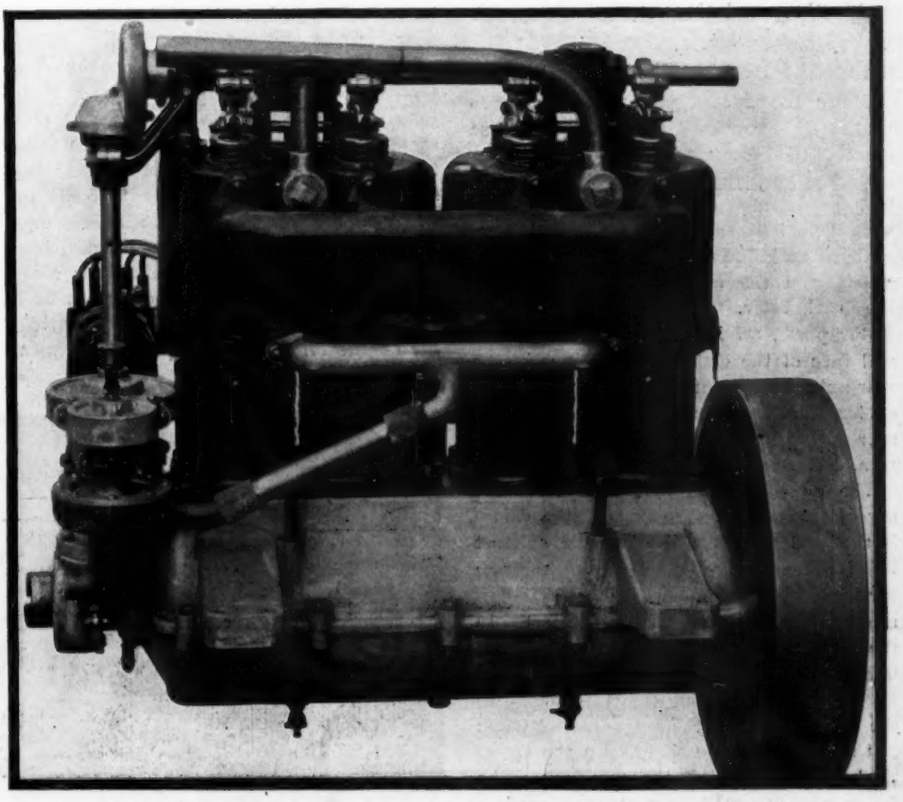
In a nutshell the transmission comprises three primary units; a multiple-disk clutch, a four-speed selective set and an arched back axle of floating construction. A brass housing on the flywheel contains the fifty-one high carbon disks of the clutch which operates in an oil bath and can be disengaged either through the clutch pedal or the emergency brake lever. Between the clutch and the gearset comes a universal joint and between the gearset and back axle is a driveshaft with two universal joints. The transmission differs from the majority of American designs in that the four forward variations are made use of instead of three and still further in that direct drive is on the fourth and not the third speed. All of the five variations of speed are accomplished by a simple H-slot quadrant in which the change speed lever works. The set is a conventional layout with main and countershafts in the same horizontal plane with the halves of the case meeting in this plane. Two sliding sets are on the squared mainshaft which is hardened and ground. The three shifter rods are carried in a lateral extension and an interlocker is provided. Both shafts revolve on plain bearings and the lubricant which cares for the bearing also lubricates the gears.

In the Moon rear axle a universal joint is interposed between the driveshafts of the axle and the differential so that it is possible to arch the driveshafts of the axle 2 degrees and thus camber the back wheels to conform with that of the front pair. The axle housing, reinforced by a ¾-inch truss rod, supports the car weight and the heat-treated axle driveshafts transmit to the wheel hubs through four-fingered clutch plates. The I-beam front axle is located ⅜ inch in advance of the radiator and using a commensurate wheelbase the body is hung well between the axles. A combination main and sub-frame system is adopted, the motor and transmission being carried on the sub-frame pieces and the side members of the mainframe dropped 3½ inches in front of the back axle, which allows of the positioning of full-elliptic springs.

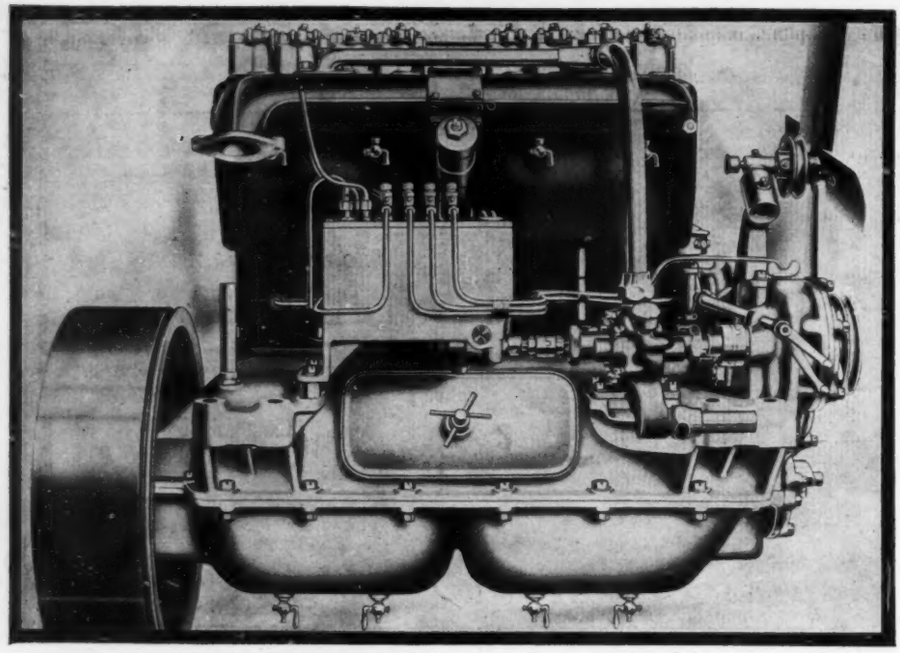
ONE 1909 GROUT MODEL

The one Grout model for this season which is built in touring car and tourabout lines is of the four-cylinder style with battery ignition, cone clutch, selective gearset, shaft-drive and 116-inch wheelbase. The motor employed has 4½ by 5-inch separately-cast cylinders with a nominal rating of 35 horsepower, its cylinders being separate castings with valves in offset chambers on the left and opened from one camshaft. Its interior parts are lubricated by a crankcase-contained system, the oil pump being driven from a vertical shaft at the front of the motor, this pump elevating oil to the crankshaft bearings whence it flows to the splash within the case. All oil above a certain level is returned to the oil reservoir beneath the crankcase proper, whence it is strained and made ready for another circulation of the motor.

The motor ignition is a battery current source, with a single coil for stepping up the voltage and a high-tension Grout distributor for delivery of current to the spark plugs, a feature of the distributor being the advancement or retarding of the spark without moving the high-tension cables to the distributor.



EXHAUST SIDE OF MOON 1909 MOTOR



EXHAUST SIDE OF POPE-HARTFORD MOTOR WITH OILER

The transmission system does not stray into the realms of unconventionality, but comprises a standard leather-faced cone within the flywheel and a three-speed selective set with one shaft located above the other. Two universal joints do duty in the driveshaft and the rear axle is well supported. In the running gear a platform rear spring is used in conjunction with semi-elliptical fronts; the sub-frame construction is used to carry the motor and gearset; and a 17-inch steering wheel is used. The wheels carry 34 by 4-inch tires and a three and three-seventh gear ratio is regularly fitted.

CHANGES IN POPE-HARTFORD

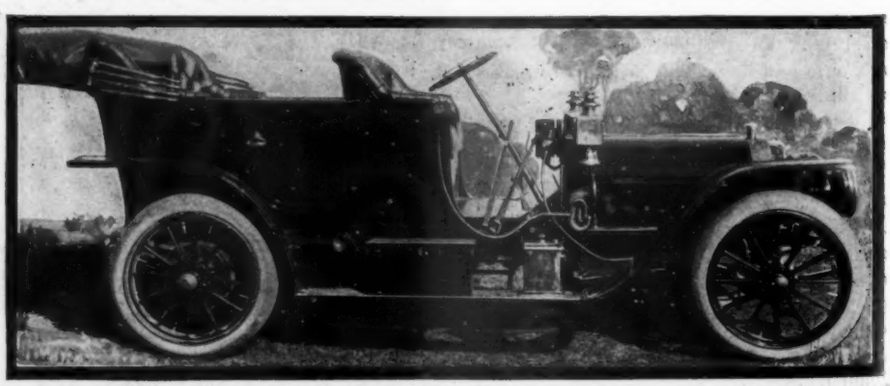
Many detail changes have been made in the Pope-Hartford car for the present season, the foremost being increase of motor power, the cylinders having 4 5/16-inch bore and 5 1/8-inch stroke. Coupled with this increase might be noted such changes as improvements in the camshaft gearing on the motor, rearrangement of the carbureter, commutator and other motor parts, an increase of the diameter and face of the clutch, alternations in the rear axle, larger rear wheel brakes entirely enclosed, altered frame construction with rear spring hangers of the gooseneck pattern, and a redesigning of body lines.

The Pope-Hartford motor has been for several seasons an exponent of the valve-in-the-head type, the intakes and exhaust being actuated by means of a rocker arm for each, operated from one camshaft carried within the crankcase on the left. In the re-designing of many parts, an accessible grouping has been accomplished at the motor front by locating the water pump at the right front and the magneto and timer at the left front, the timer on a short vertical shaft driven off the camshaft. The fan is now mounted on a standard and is provided with a readily-adjustable device for varying the belt tension consisting, in brief, of a cylinder within a sleeve and a set screw to hold the cylinder at any point within the sleeve. The carbureter is located close to the magneto and connects by a T with the intake valves. It draws its hot-air supply from the exhaust manifold by a pipe running between the twin castings. On the exhaust side is the multi-feed mechanical oiler driven through a continuation on the pumpshaft. Four of the leads from the oiler connect direct with the cylinders and a fifth with the half-time gear housing at the front.

From a structural viewpoint the motor is fairly symmetrical design, the twin castings are of practically uniform size throughout the waterjackets and the location of the valves in the head eliminates side pockets. The crankcase is made in upper and lower halves with a compartment at the forward end for the half-time gears. And the design of the gear compartment is such that the camshaft and gears may be removed without dismounting the engine from the frame. By casting a part of this gear compartment integrally with the crankcase splash lubrication for the gears is furnished which must be considered one of the features of 1909 Pope-Hartford construction. Access to the crankcase is afforded by an exceptionally large cover plate on the right side located centrally and through which all the lower connecting rod bearings can be reached. The cylinders, piston, crankshaft, camshaft, wristpins and other working parts are ground. As is the case with a majority of motors with valves in the head the water piping is slightly different from that of the T-head motor. In the first place the water enters the jackets at the top between the exhaust valve cages, and leaves the jackets at the top on the opposite side, there being partitions to insure circulation throughout the entire jacket space. This arrangement of the water piping coupled with the fact that the intake manifold and the exhaust manifold are carried well up on the cylinder heads, leaves open space between the carbureter, magneto, timer and oiler, which are grouped much lower around the base of the cylinders.

Leaving the motor, the novelty of the transmission system rests with the new floating type rear axle, in which are used two solid nickel steel shafts running inside of the housing, the housing carrying the entire car load. The outer ends of the driveshafts are squared and on each is fitted a six-jaw hardened steel clutch which engages in corresponding notches in the hubs of the rear wheels. The rear wheels are carried on Timken roller bearings, located on the outside of the axle housing. This conventional axle construction permits of removing the axle shafts from the differential without dismembering the axle housing. A glance at the external construction of the axle shows the absence of a truss rod which is in keeping with advanced foreign Anglo-American practice. The differential housing portion is made somewhat larger than ordinary, with the housing part well webbed along its lower line. The gearset employed is of the selective type, giving three forward variations. Thirty-four by 4-inch tires are regularly fitted.

The complete body line represents seven styles, all of which are larger and roomier than 1908 and made with wider and deeper



GROUT 1909 FIVE-PASSENGER TOURING CAR

seats. The bodies are built largely of metal and use straight dashes on the touring, limousine and landaulet lines. Of the seven bodies the distinctly new ones are toy tonneau, seven-passenger touring car and two semi-commercial types, namely, ambulance and police patrol.

NEW COMMERCIAL CONCERN

Following several most successful tests of a four-wheel drive car, the joint invention of Otto Zachow and W. A. Besserdich, a company has been organized at Clintonville, Wis., with a capital stock of $45,000 to manufacture the car on an extensive scale. The company is titled the Badger Four-Wheel Drive Auto Co. The power is applied to all wheels. The engine will be of the four-cylinder type and develop 40-45 horsepower.

WILL MAKE CARROLL MOTOR

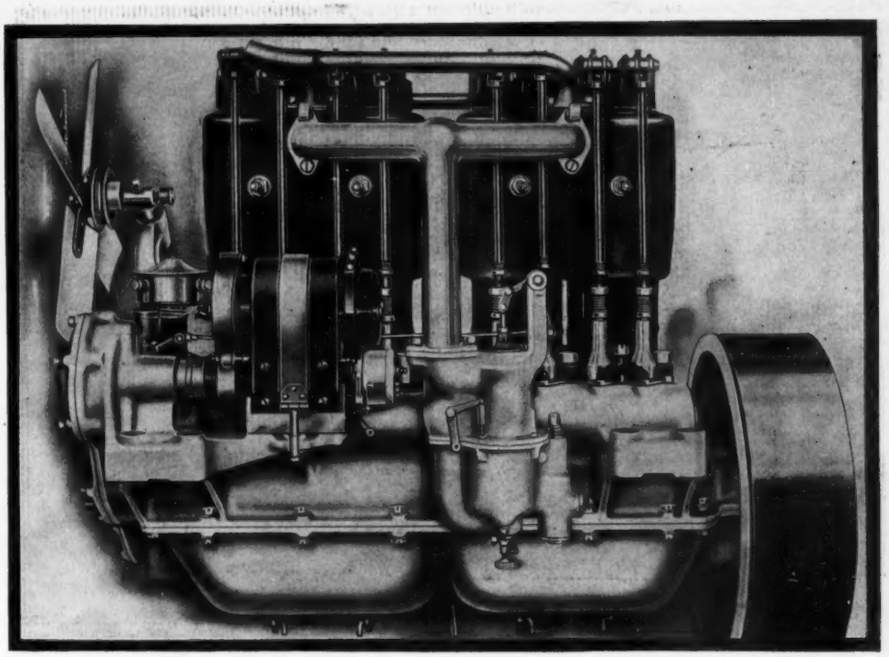
Cavillers at the utility of carbonic acid gas as a motive-power will have an opportunity at the Philadelphia show of thoroughly examining the Carroll engine and the method of applying power. Inventor John E. Carroll will be there all the week. The Carroll Power Co. has been formed, and within a comparatively short time a low-priced touring car will be placed on the market. Arthur Groom, 1430 South Penn square, is the distributing and financial agent of the company, which has progressed so far as to be seeking agents in the various large cities of the country.

WILL MAKE DARBY CAR

At the opening of the St. Louis show next month a new motor car company will make its public debut. The concern is now at work on its first two cars, which will be shown at the Coliseum exhibition, February 15 to 20. The car will be called the Darby. A two-cycle two-cylinder motor will be used in connection with friction-drive transmission. The Darby will be built only in runabout style with single and double rumble seat. Left-hand control will be provided. Harvey D. Dunham and Allen Whittemore are officers in the Darby Motor Car Co., for which corporation papers have been filed.

MOTOR CAR LITERATURE

Advantages of air-cooling are told in the catalog of the Middleby Auto Co., which manufactures the Middleby car at Reading, Pa. The booklet is simply a forerunner of a more pretentious catalog and illustrates the full line.



POPE-HARTFORD MOTOR WITH MAGNETO AND TIMER

Those interested in ignition apparatus can secure plenty of information on the subject from the latest literature issued by the J. S. Bretz Co., which handles the Unterberg & Helmle product. The booklet is interesting reading from the front page to the back cover and one chapter is devoted to ignition troubles by owners who may be inexperienced in this line. Paragraphs are devoted to missing on one cylinder, irregular ignition, failure to start and spark plugs. In addition the U & H high-tension magneto is fully illustrated and described.

The Alden Sampson Mfg. Co. tells all about its trucks, omnibuses and road trains in its catalog on commercial vehicles. This company is the originator of the gas-electric road train which is illustrated.

The Sharp Arrow, the dark horse that won one of the sweepstakes on the Long Island motor parkway last fall, is described in the advance section of the catalog of the Sharp Arrow Automobile Co. The pamphlet is tasty and one section of it is devoted to what the daily papers had to say on the work of the Sharp Arrow on the road.

Hartford's latest, the McCue car, is described and illustrated in an unostentatious catalog just off the press.

By looking at the catalog of the Corcoran Lamp Co., of Cincinnati, O., one comprehends the size of the line of Corcoran lamps manufactured by this concern. The lamps are well illustrated and described, which is something unusual in literature of this sort.

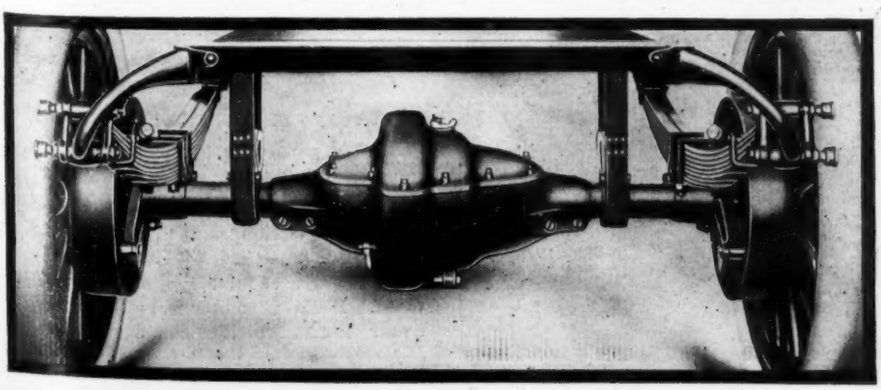
Proud of the record run of the Packard from Pittsburg to Philadelphia, which was made in 14 hours 1 minute, the Packard Motor Car Co. tells all about it in a unique pamphlet which is illustrated with scenes taken on the run and which also contains a huge map marked in red, which shows the route taken.

"Auto Comfort" is a neat-looking and cleverly-illustrated house organ issued by the makers of the Truffault-Hartford shock absorbers. Accompanying it is a large half-tone illustration of the finish of the Vanderbilt cup race, in which the Locomobile is given due credit for its victory.

Brave in its blue cover and red letters and quite out of the ordinary is the catalog of the Velie Motor Vehicle Co., which has entered the motor car field with a line of cars. The pamphlet describes the cars by means of half-tones and intelligent reading matter.

Bodies such as are made by the Reading Metal Body Co. are well described in the company's new catalog. Designs made for several prominent concerns are illustrated.

"Cup Winners for 1908," issued by the Fisk Rubber Co., tells of the work of these tires in the various contests last year.



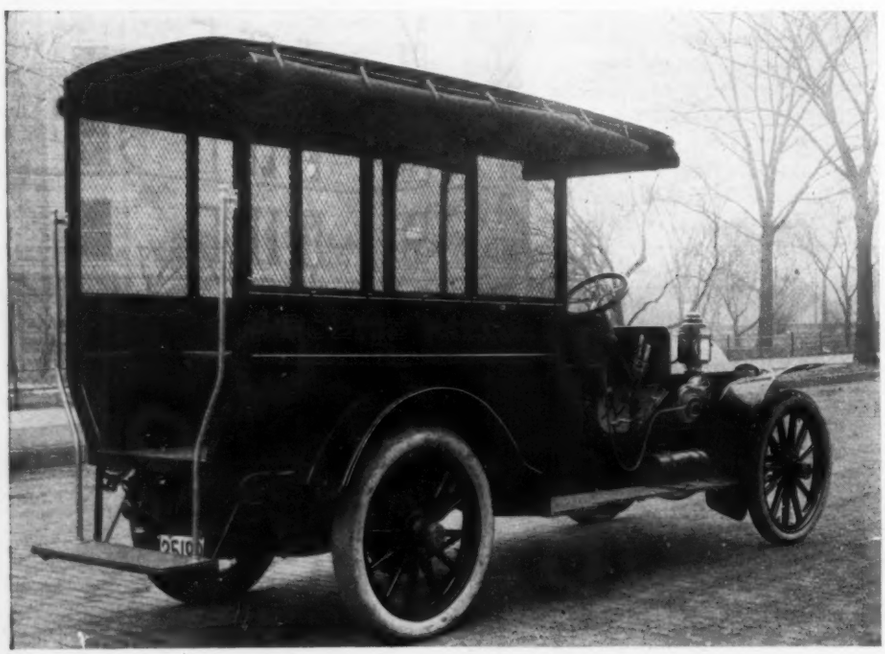
NON-TRUSSED POPE-HARTFORD FLOATING AXLE

The Realm of the Commercial Car

TWO PACKARD TRUCKS USED BY THE ADAMS EXPRESS CO.

Express Company Service

THROUGH express from the west is now delivered to the consignee in New York city just 24 hours sooner than it was before the Adams Express Co. placed a Packard 3-ton truck in night service. This truck, which is one of the fourteen Packard trucks used by the Adams company in the metropolitan district, runs between the Adams company's Jersey City dock, its garage and distributing station on West Forty-seventh street, its Harlem station on One Hundred and Twenty-fourth street and its Brooklyn depot. It combines the handling of packages to be transferred between these stations with carrying incoming and outgoing through express. The service between trains and distributing points which it renders through the night allows the actual delivery of western express packages 1 day in advance of the previous schedule. The Adams Express Co. was one of the first advocates of motor wagons. Its experience in motor traffic started with steam wagons, which were discarded in favor of electrics. A number of the latter are now used extensively in several cities. This pioneer work in the development of motor service, it is asserted, has been due to a firm belief in the eventual supersedure of horses for business hauling. It is pointed out that the volume of business in New York and other large cities is increasing so rapidly that the old horse delivery system will soon be rendered absolutely inadequate. Not only has the routine delivery and collection work on established routes become steadily greater, but much more territory has to be covered than formerly, and this territory will continue to increase. Consequently motor trucks hauling heavy loads over comparatively long distances will greatly increase efficiency and effect economy. Knowing that the proper care and handling of motor vehicles is a most important consideration in obtaining efficient and economical service, the Adams Express Co. has gone about the maintenance of its gasoline trucks in a thorough and practical manner. At 242 West Forty-seventh street there is a special gasoline vehicle garage of concrete construction. In this garage there is not only storage room, but a complete repair shop and staff of mechanics, under the charge of a superintendent of garages, who directs the care of the trucks and plans their general system of usage. The trucks are carefully looked over by experts when they are in the garage, so that they are not likely to be sent into service in any other than first-class condition. Most of the drivers were broken into the work by the Adams Express Co., and constitute a more carefully trained corps of drivers than is ordinarily encountered in similar work. At the present time two floors of the gasoline garage building are used as a stable for horses and as storage room for wagons, but the building is in such shape that this room is quickly available for an increase in motor equipment.



POLICE PATROL MADE BY AMERICAN LOCOMOTIVE COMPANY FOR RICHMOND, VA.

CHICAGO'S MOTOR CAR FUNERAL

An improvised motor hearse was used recently in Chicago for the funeral of Wilford Pruyn, a chauffeur in the employ of the Coey company. The body of a theater bus was removed from the Thomas chassis and a regular hearse body substituted. Eighteen motor cars followed the motor hearse to the cemetery and the claim is made that this is the first motor funeral ever held in which the hearse and vehicles carrying the mourners and

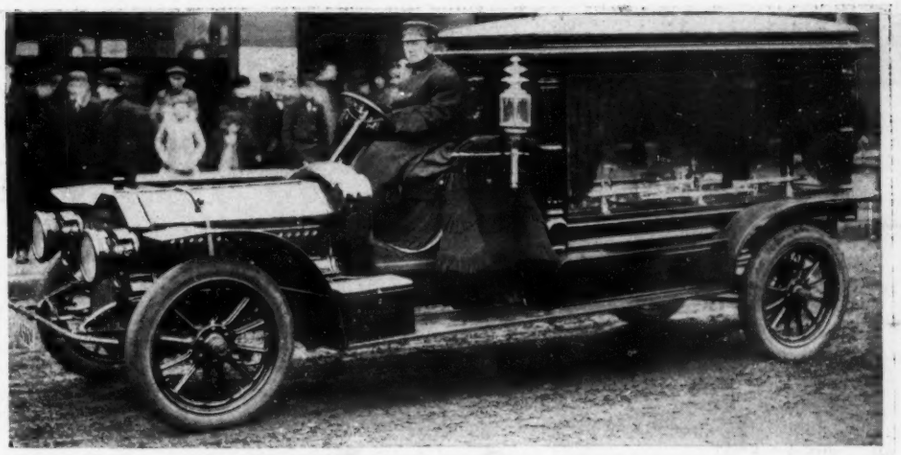
friends were propelled by motor power, although this may be disputed by Savannah, where the mechanic killed in practice for the small car race last November, was buried, his remains being carried on the chassis of the S. P. O. In this case, however, no hearse body was attached.

WILL CONTINUE PLYMOUTH LINE

The Commercial Motor Truck Co., of Plymouth, O., which was thrown into bankruptcy about 1 month ago, was sold on January 11, the entire property of the company being purchased by certain interests, which have already organized what will be known as the Plymouth Motor Truck Co. and which will take over the entire business of the Commercial Motor Truck Co. and will continue the manufacture of Plymouth cars as before. H. H. Fate, formerly president of the Commercial Motor Truck Co., is connected with the Plymouth Motor Truck Co. in the same capacity, while W. C. Guilder, formerly manager of the Commercial Motor Truck Co., will be vice-president and general manager of the new concern. The Plymouth Motor Truck Co. will place on the market, in addition to its line of passenger cars and delivery wagons, from 1,000 to 5,000 pounds capacity, a new model 3 to 4-ton truck; also a light delivery wagon, with a maximum capacity of 800 pounds. The Plymouth Motor Truck Co. will use the double variable speed friction transmission on each of these different models.

WORK OF RAPID TRUCK

A trip of 900 miles in 7 days with a total time of 70 hours, has just been completed in New York by a Rapid truck, operated by Frank Cochran and carried three passengers, under the direction of T. P. Hyers. Through sleet and snow and over roads rough and rutty, the Rapid plowed its way from Pontiac to New York, a winter record for a truck. The truck was the same that was driven in the Glidden tour last summer, carrying Goodyear bottles. The rig used is of a 1-ton variety, combination, packages and baggage truck. Pontiac, the home city, was left on December 20, in 4 inches of snow, with the roads frozen and very rough. On the first day Toledo, 86 miles, was reached, and on the second day the long run of 122 miles to Cleveland was made. This was considered the longest run of the trip, but on the following day the journey of 193 miles to Buffalo was completed successfully, although the roads were lost several times on the run. It was bitter cold and the wind from the lake was so strong that the pyrolene windows in front were blown out on several occasions. Rochester, 80 miles further, was reached on the following night, and until then the speed was 29 miles per hour in 3 to 4 inches of snow. The snow was deeper along the side, and in passing farmers it was necessary to plow around them. In sleet and snow, Utica was reached this day, 153 miles. From Utica the truck went down the Mohawk valley and as it was Christmas day, the roads were not opened and the run to Albany, 96 miles, was considered a great day's work. On the following day the completed run from Albany to New York, 158 miles, was made. On this trip the Rapid went over the mountains not far from Peekskill, and at one time skidded 25 feet to the edge and was only saved from going over by a convenient tree.



IMPROVISED MOTOR HEARSE USED IN CHICAGO

MOTOR MAIL SERVICE PLEASES

Postmaster David C. Owen, of Milwaukee, has returned from Washington, D. C., where he conferred with the postoffice department heads on the matter of extending the successful motor mail distributing and collecting system. The system is Mr. Owen's idea and Milwaukee is the first city in the country to have its advantages. It is planned to extend the service to give West Allis and other big manufacturing suburbs three or four mail deliveries daily, and it can be done only by motor power to make it satisfactory. The Milwaukee postoffice has in service four Johnson steam cars, made expressly for the purpose by the Johnson Service Co., which later entered the manufacturing field with the Johnson gasoline car. Two other steamers are kept in reserve for emergencies. Mr. Owen is inclined to think that his request will be granted, and he is assured that the motor mail system will be introduced in other large cities at once. Mr. Owen has been asked to become first assistant postmaster general by Frank Hitchcock, but may not accept, preferring to stay in Milwaukee.

MOTOR PATROL FOR RICHMOND

A "hurry-up wagon" of 40-horsepower, which is two or three times the usual power for such vehicles, has been purchased by the police department of Richmond, Va., from the American Locomotive Co. The new wagon is a special body built upon the regular 40-horsepower A. L. Co. chassis of the Locomotive company.

RAPID TRUCK WHICH MADE LONG WINTER RUN

From the Four Winds

FIRST ANNUAL OF ACCESSORIES MAKERS — HELD DURING SHOW IN NEW YORK CITY

Renault in Briarcliff.—Paul Lacroix made the first entry for the 1909 Briarcliff cup race, nominating a Renault.

Farmers Urge a Tax—Some of the farmers' clubs of Chester county, Pennsylvania, are agitating the passage of a new state law placing an annual tax of $30 on every motor car, claiming that "motor cars do more to ruin the roads than any other vehicle."

Must Have Drip Pans—Mayor George Guthrie, of Pittsburg, has signed an ordinance providing that every motor car shall be equipped with a drip pan. The recent complaints of drivers on the macadam and asphalt pavements in the east end to the effect that their horses could not stand up on the greasy pavements are responsible for this measure.

Denver Club House Warming—The new club house quarters of the Denver Motor Club were formally opened on the evening of January 23. The event was an old-fashioned house warming. Smoke material and the usual decoction for which a punch bowl was invented, a lunch that satisfied the palate and vaudeville stunts, giving samples of the talent at that time displaying itself at each of the dozen show houses in the city, made an enjoyable evening.

Talk Taxicab Law—District Commissioner West and Major Sylvester, chief of police, of Washington, D. C., have suggested an amendment to the police regulations providing for the testing and inspection of taximeters used on taxicabs. Commissioner West said that the varying amounts collected by taxicab drivers for an equal distance indicate that some of the taximeters do not register the distances correctly and that there is a need for a test of the measuring instruments employed. Major Sylvester said that at the present time there is no means at the disposal of the authorities whereby they may exact from the taxicab companies a correctness in this regard. "It occurs to me," continued the major, "that not only should the mechanism be assured to be correct, but a ground space should be laid off at some point where they may be tested by duly authorized officials."

Merger Talked Of—It is understood that the Indiana Motor Club and the Indianapolis Automobile Trade Association will be merged within a few weeks. The former club is composed largely of owners and drivers, while the latter membership is made up of tradesmen, both manufacturers and dealers. It is believed that best interests could be served with only one organization and the matter will be brought up at the annual meeting of the I. A. T. A. within a short time.

Hoosier Parkway Plans—It is expected that the beginning of actual construction work on the proposed motor course to be built by the Indianapolis Motor Speedway Co. near that city will be made a matter of considerable importance. Citizens of Indianapolis seem desirous of marking the event in a fitting way and Mayor Charles A. Bookwalter, it is understood, would be glad to participate, as he is an enthusiastic motorist and was formerly engaged in motor car manufacturing. No plans have been completed by the parkway officials.

Fear Smugglers—Custom officials at Niagara Falls announce that henceforth they will be very strict in their inspection of motor cars brought into the United States at that point from Canada. The purpose of the plan is to prevent the smuggling of goods in cars and other vehicles. An amusing feature regarding motor cars has just come to light at Niagara Falls. For some time there has been an epidemic of hoof and mouth disease among cattle in New York state and elsewhere. In order to check the spread of the disease horses, carriages and even motor cars were for a time not permitted to enter Canada at the Falls. Motorists have not been informed that the embargo placed on their machines has been lifted. That motor cars would help to spread a disease among animals is a novel theory.

Renault Leads in Imports—The New York custom house reports on importations shows from January 1, 1908, to December 1, 1908, with taxicabs excluded: Renault, 244; Fiat, 149; Panhard, 89; Mercedes, 89; Isotta, 40; Itala, 24; Hotchkiss, 22; de Dietrich, 19; Lancia, 18; C. G. V., 16; Delaunay-Belleville, 14; Rochet Schneider, 11. In 1907 the Renault led with 214 cars imported.

Show On Coast—The first annual show, given under the auspices of the Portland Automobile Club, of Portland, Ore., will be held in the armory, a large stone building, occupying one entire block in the city of Portland, March 8-14. No city in the union has increased its population as has Portland. In 1900 its population was 91,000, and today the smallest estimate puts it at 275,000.

Denver's Fire Chief in Luck—The Denver fire department has placed an order for a second motor car for the chief. For about a year he has been using a Premier runabout. This will be used by the assistant chief in the future, after the chief receives a 45-horsepower Stoddard-Dayton with a specially constructed body in which to carry helmets, coats, boots and other paraphernalia.

Gloom in Milwaukee—Although the city of Milwaukee, Wis., has a comprehensive system of municipal motor cars, it is declared that the city is still far behind other cities of its class in comparison. Several members of the Milwaukee board of public works attended a convention at Cleveland, O., last week, and the most lasting impression, perhaps, that the visit left upon them was the fine motor car inspection system. The Milwaukee board has been working for some time to get the common council to purchase a car for its use not only in inspecting, but for accommodation of visitors and experts. The hope of getting a car has been somewhat dimmed now that the purchase of

a car for the use of the detectives of the city police department has been delayed by injunction, secured by a Milwaukee manufacturer.

Chauffeurs Call Meeting — James B. South, of Louisville, Ky., chairman of the National Association of Automobile Chauffeurs, announces in its publication that there will be a convention of the professional chauffeurs at the Lexington hotel, Chicago, on the evening of February 12. All chauffeurs are requested to attend this convention. There will be delegates from New York, Cleveland, Cincinnati, New Orleans, Philadelphia, St. Louis and Louisville in attendance.

Annex for the A. C. A.—C. P. H. Gilbert is preparing plans for the annex which the Automobile Club of America is to build at 242-248 West Fifty-fifth street. While the height of the new building has not yet been determined, it is probable that it will be at least fifteen stories. A large part of the annex will be devoted to storage and repair purposes, but the upper stories will be provided with the same accommodations to be had in first-class hotels.

Traffic Rules Work Well—The new traffic regulations in Boston seem to have proven a much greater success than was anticipated. The first 10 days brought few complaints and much praise. Police Commissioner O'Meara has picked out a squad of good men and they have used much discretion in handling the new problem. Some of the regulations regarding the length of time teams may stand to deliver goods are being modified, but taken altogether it has been easily seen that business has been expedited in a general way, and better results are now certain the longer the regulations are in force.

Syracuse Club Meeting—At the annual meeting of the Syracuse Automobile Club held recently in the Yates hotel, Syracuse, N. Y., reports of a most encouraging nature were presented and officers for the year elected. Secretary Forman Wilkinson reviewed the work of the past year, showing the membership now to be 217, an increase of sixty-eight members during the year. Much was accomplished in the way of placing road signs throughout central New York during 1908. There were 125 placed during the season, showing dangerous crossings, warnings and giving general information to drivers. Places are already mapped out for more than 100 signs to be located this year, sixty of which are now on hand and will be put out as soon as possible. It is intended to hold an endurance run early this summer, open to members only. Plans are also under way for a hill-climb on one of the longest and steepest grades in this vicinity. The officers elected for 1909 are: President Hurlbut W. Smith; first vice-president, Howard P. Denison; second vice-president, Dr. C. M. Ryan; secretary-treasurer, Forman Wilkinson; board of directors, Alexander T. Brown, D. E. Watson, J. William Smith, C. C. Bradley, Jr., and Willett F. Brown.

To Test Chain Law—Ralph Coburn, of the Maxwell agency in Boston, is going to make a test case of the chain regulation of the metropolitan park board of Massachusetts. He was arrested recently and intends to fight the case to a finish. Various attempt have been made to bring this to a head, but the men who have started to fight the regulation found that their cases were placed on file giving them no chance. It is understood that Charles T. Terry, of the A. A. A., and the Weed chain people will aid in the matter.

Undertaker Converted—The Cassel Co., of Milwaukee, recently incorporated with a capital stock of $11,000 to do an undertaking and livery business, may establish a motor car service for funerals instead of horses. Peter Cassel is the first undertaker in Wisconsin to use the motor car to lead funeral processions. Mr. Cassel has not definitely decided to break away from custom altogether, but says he will eventually do so. The great saving in the cost of maintenance strikes him as being the best argument in favor of motor-propelled vehicles over horse-drawn vehicles.

Reading Wants a Reliability—Reading, Pa., motorists are laying plans for a 1-day endurance run to be held early in the spring over a course to be decided upon later. Two courses are already being considered—one touching Ephrate, Lancaster, Elizabethtown, Harrisburg and Lebanon, about 130 miles; the other including Kutztown, Allentown, Bethlehem, Easton, Doylestown, Morristown, Collegeville and Pottstown in its itinerary, and totaling about 175 miles. With Philadelphia, Harrisburg, Morristown and Wilkes-Barre to draw from, the Readingites are looking for a record-breaking entry list.

Will Use Motor Cars—The Duquesne Incline Plane Co. has a contract signed with the Automobile Transfer Co. for the hauling of passengers from the foot of the plane to Fifth and Liberty avenues, Pittsburg, in motor cars. The contract calls for cars to be furnished so that a schedule of one every 4 minutes will be maintained during the rush hours and one car every 8 minutes during the rest of the day. The service is to be established April 1. The cars will carry twenty-two passengers each and each passenger will be furnished with transfers good any time during the month in which they are issued. The route will be from the foot of the plane in Carson street, down Carson street to the Point bridge, across the Point bridge to Water street, Water street to Liberty avenue, Liberty avenue to Fifth. The car will return to the plane by the same route. It is estimated that it will take 4 minutes to make the run from the plane to Fifth and Liberty avenues. This move on the part of the incline plane company was caused by the refusal of the Pittsburg Railways Co. to accept the transfers issued by the incline company.

Want Free Ferries—A movement is on foot to make free such ferries as now ply on the Connecticut river where there are no bridges. As motorists have no other means of reaching either shore without an extensive detour, the ferries derive quite a revenue. That at Lyme at the mouth of the river did a hustling business all summer.

Market in Siam—It would seem that Bangkok, Siam, is one of the best markets for motor cars in the east, the number now in use being about 300. The great majority of these cars are owned by Siamese and used for pleasure purposes. The import shows no sign of slackening and so long as it is the fashion to drive a motor car, so long will the demand continue. The roads have been much improved in the last few years, the improvement being almost entirely due to the advent of the motor car.

Denver Glidden-Mad—Denver proposes to have the Glidden tour extended to that city, if the work of its commercial bodies can possibly accomplish it. Strong letters have been sent to Frank B. Hower from the officers of the Denver Chamber of Commerce, the Denver Real Estate Exchange, the Denver Convention League, the Colorado Manufacturers' Association, the Colorado State Commercial Association, the Colorado Traffic Club and the Denver Motor Club. Each in its own way is setting forth the attractions such a trip would present to Americans in their own country.

Pittsburg Dates Set—On March 17, 18 and 19 an endurance run, open to all makes of cars, will be conducted by the Pittsburg Gazette-Times and the Pittsburg Chronicle-Telegraph. Unlike the usual test of this nature, the proposed run will be for classes divided according to the selling price of the cars. Numerous prizes, with special awards for each class and a grand prize for the car making nearest the perfect score, will be offered by the Gazette-Times and Chronicle-Telegraph. Should two or more cars tie in the best score, they will continue on a special run after the others have finished the regular schedule.

New Guide Posts Scheme—The increasing need of guide posts along Indiana roads is beginning to be recognized by authorities of that state and something along that line will be done by the legislature, now in session. Warden Reid, of the Indiana prison; Superintendent Whittaker, of the Indiana reformatory, and Representative Miles Furnas are now working on a bill which will be introduced within a few days. The bill will provide that signboards shall be made by prisoners of the state institutions and posted on the roads by prisoners in the county jails. There seems to be little opposition to the proposed plan.

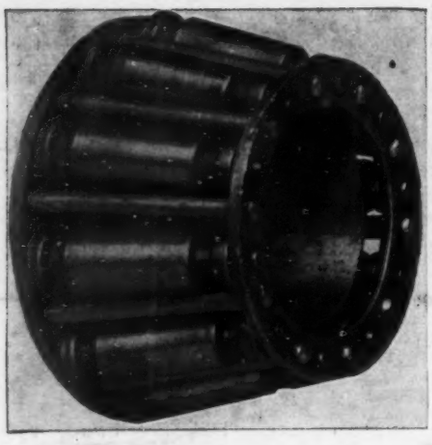


FIG. 2

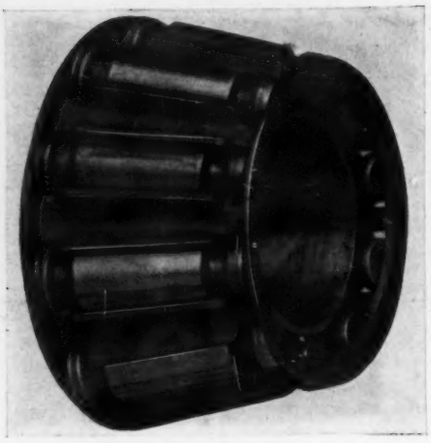


FIG. 3

FIG. 4

Manufacturing Roller Bearings

GENERALLY speaking, human beings are paradoxes; they do things at the start in the most roundabout clumsy manner, and only after bestowing much thought and effort are the unnecessary parts removed and a really simple design obtained. This has been true with new lines of manufacture for years. It has been true with many of the new features in connection with motor cars, and doubtless will continue to be true. An interesting example of this trend from the more complex to the simple in motor car work is the roller bearing of the Timken Roller Bearing Axle Co., Canton, O.

There is one fact present in all taper roller bearings. The roll has a slight tendency to get out from between the cup and the cone, to work back in the direction of its large end. This tendency is there and cannot be eliminated. It then becomes a question of how to check this inherent tendency of the roll to move endwise, and herein lies the principle of the Timken. In all taper roller bearings, some part of the cone is arranged to receive this slight thrust of the roll. In the Timken bearing, this provision is made at each end of the roll.

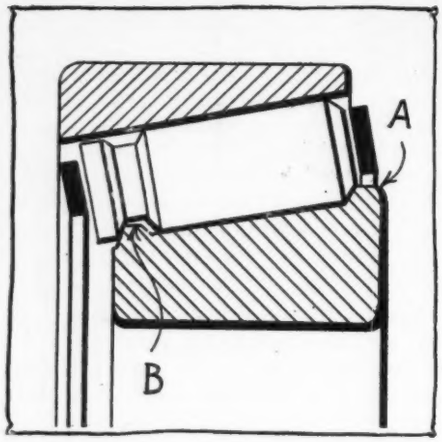


FIG. 1

If a log were being rolled along the floor and there was a slight obstruction opposed to the log at one end, the result would be to skew the log out of its original position. If this slight obstruction were divided equally between the two ends the motion of the log would be slightly retarded but it would not be skewed from its original path. In a roller bearing it is vitally important to keep the roll moving in a fixed path so that its center always remain true with the cone; in other words, the contact of the two must be a line.

It is evident therefore that, given this inherent tendency of the roll to work endwise, which cannot be eliminated from a taper roller bearing, and given the vital requirement of keeping a true line of contact between the cone and roll, the means for checking the end movement of the roll must be such as not to disturb the alignment of roll and cone. On the cone, Fig. 1, are two ribs A and B, one at each end of the track for the rolls, and on the rolls there are shoulders to engage these ribs. These features are distinctive of the Timken bearing and are present in all stages of its development. Originally, each roll had a projecting nib at each end. These rested in holes in two cage rings—one at each end of the bearing—the cage ring being properly spaced by shoulder pins riveted in place. In this manner, the rolls were retained on the

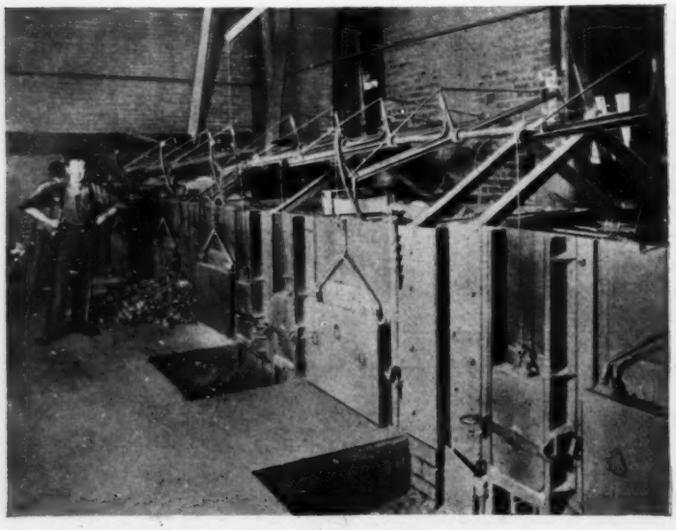


FIG. 6—THE LONG LINE OF CASE-HARDENING OVENS

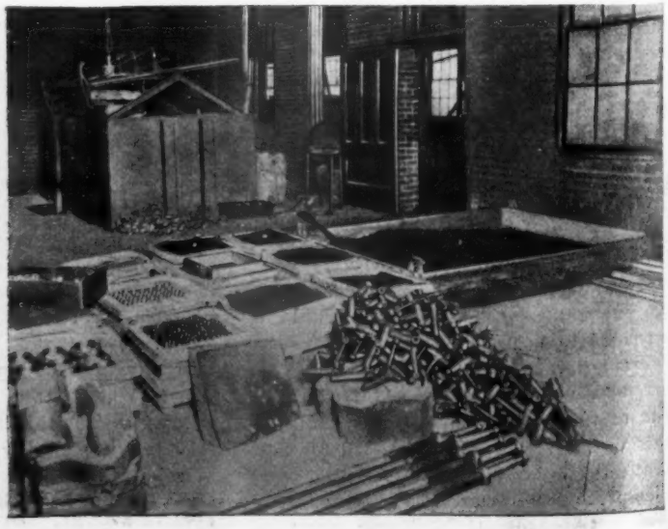


FIG. 10—PACKING BEARING PARTS IN CHARCOAL FOR CASE-HARDENING

FIG. 7—MICROMETERING THE ROLLER

cone. The cage in the Timken bearing is in no sense a guiding member for the rolls. They are self-guiding by virtue of the two ribs. The only function of the cage is to bring the rolls around the non-working side of the bearing and present them to the working side. This form of bearing is illustrated in Fig. 2. The first change in design was the one-piece pressed steel cage, having individual pockets for the rolls from which the end nib was eliminated. This form is shown in Fig. 3.

It is evident that a stronger and more rugged roll was obtained, as well as a stiffer and simpler cage. The general appearance of the bearing also was considerably improved. The next improvement was to eliminate that part of the roll beyond the upper working shoulder, as shown in Fig. 4. Reference to the fundamental principle of the bearing will show that the flange of the roll at its larger end performs no useful function since all tendency of the roll to move endwise is checked at the large end of the roll.

If a log were being rolled along the floor and there was a slight obstruction opposed to the log at one end, the result occurs at the end only.

This very materially shortened the bearing and a still further shortening of the roll was found possible due to better material and more careful workmanship. The result is a taper roller bearing, occupying very little, if any more, length along the shafts than is required for an annular bearing and of very much less diameter than the latter.

Returning now to manufacture, it will be discovered that the grade of steel used always has been of a special analysis found to give uniform results in case-hardening. Cup, cone and rolls are all carbonized and hardened. The cone and cup always have been ground accurately. Originally the rolls were not ground but adequate means for doing this grinding of tapered rolls were finally developed and special machines now grind them accurately to the correct taper. Many different materials have been tried and now a special alloy steel is used for the rolls having an elastic limit of 125,000 pounds per square inch, and a tensile strength of 190,000 pounds per square inch. Special machinery has been developed for almost every process, including the production of the green cup, cone and roll; the case hardening; the grinding, and the inspection.

A hasty ramble through the factory tells in consecutive fashion of a few of the steps of manufacture of these bearings. At one place four nickel steel rods are feeding into an automatic machine and the formed rollers are dropping into the oil bath at the other end, not a human hand needed in the work excepting the services of an overseer. At another point a brigade of automatics are similarly making the cups and cones; a little further these cups, cones and rolls are packed with animal charcoal, Fig. 10, in iron boxes to be heated in case-hardening ovens; and a step further automatic revolving gas furnaces give each piece of metal passing through them the same degree of heat before discharging them into oil baths for hardening and toughening them. This completed, every roller is ground on an automatic grinder, Fig. 8, to a proper taper and correct diameter; the cups and cones are similarly ground to size. The grinding is followed by a sorting of these, Fig. 9, that have worked to correct size, whereas those that have sprung more or less in the hardening are re-ground to a smaller diameter. The same care is taken with the cups and cones. The grinding process completed, the rollers are gauged to see if they are of correct diameter and taper and are sorted into different boxes and each box containing rollers of practically the same diameter at the middle point of the load-carrying surface and by which operation the rollers are sorted into groups not varying more than one two-thousandths inch. Following this final stage the assembly process starts.

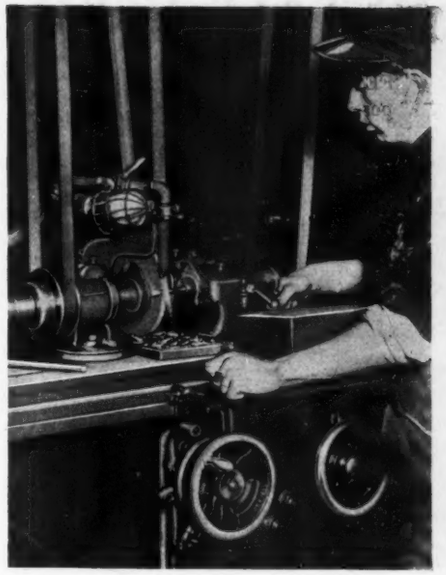


FIG. 8—GRINDING THE TAPER ROLLER

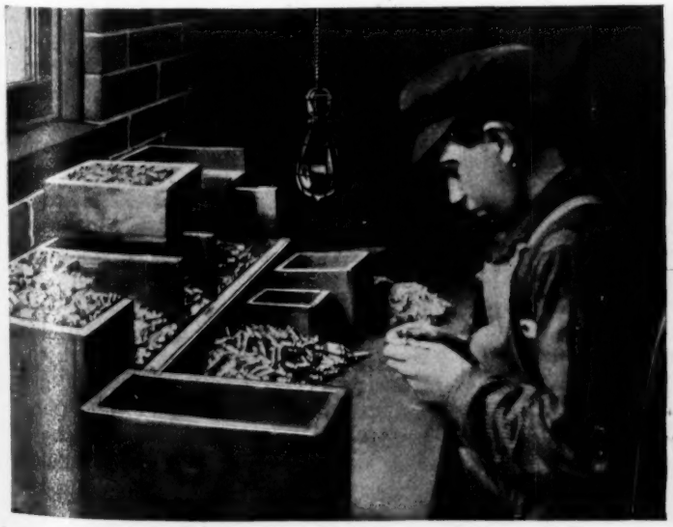


FIG. 9—SORTING BEARING PARTS AFTER FIRST GRINDING

FIG. 5—ASSEMBLING THE TIMKEN ROLLER BEARING

METALS USED IN MOTOR CAR CONSTRUCTION

By Elwood Haynes

A FEW years ago it was considered impossible to build a self-propelled vehicle for the common roads that could be operated continuously in a practical way because of the very high cost of upkeep. A large part of this excessive maintenance cost was due to the breaking or bending of the various parts of the machine. The early builders of motor cars were not only annoyed almost beyond endurance from this cause, but the problem became so serious that for a time the success or failure of the entire business seemed to hinge upon the possibility of obtaining the materials which would stand the extraordinary stresses imposed by this new means of locomotion.

Many entertained the idea at first that excessively tough materials would best answer the purpose, and hence employed Swedish iron or very low carbon Bessemer steels. These were found to be absolutely unsuitable in many instances, not because of breakage but on account of the readiness with which they would bend and take excessive and permanent set, thus throwing the parts out of line and rendering the machine in a short time practically inoperative. Higher carbon Bessemer steels were employed with but little advantage; it is true that they were more elastic, but after a limited amount of use they would deteriorate in strength and finally break in most unexpected places.

Use of Nickel Steel

Alloy steels were almost unknown in mechanical constructions in the '90s, though nickel steel had been tested to some extent chiefly by firms supplying armor plate steel to the government. However, it was of doubtful utility until introduced into the motor car. The early users of this steel were highly pleased with the extraordinary improvement which it introduced into the machines. First, it proved a great boon in the construction of live rear axles, which when made of ordinary steel had been bending or breaking to an alarming degree. Next, it was tried in crankshafts, which had also given much trouble. Later, it was used for the construction of sliding-gear wheels employed in the transmission of the car. Its introduction was not always attended with satisfactory results, but generally speaking the improvement which it made was of a most marked character.

Unfortunately, a number of builders regarded nickel steel simply as an alloy of iron and nickel containing a certain per cent of the latter metal. They were not particular about the other constituents of the alloy or how the steel was made. This was the cause of a great deal of trouble in the early use of nickel steel. Firms that had never had any experience with alloy steels immediately began making nickel steel of inferior quality and placing it upon the market. Much of this steel was too high in carbon for the purpose intended; other samples contained considerable quantities of phosphorus and sulphur, thus rendering them unfit for use, while still others were carelessly made up and little if any superior to the ordinary Bessemer product. Gradually, however, it was learned that certain precautions were necessary to make a good nickel steel, and that the steel must be of such a composition as to answer the requirements necessary in a particular part of the machine.

Chrome-Nickel Steel

A little later chromium was introduced into the nickel-steel, and its effect was found to be very marked; but while it greatly improved the strength of the nickel steel, it was found to be very much harder to work, and since it is a triple alloy of iron, chromium, and nickel, besides containing various percentages of carbon, its manufacture and manipulation required much greater care than the making of carbon steel or nickel steel. Moreover, the carbon content must be very carefully controlled or the steel will be greatly modified in its properties and may be rendered utterly unsuitable for the purpose intended. Owing to the great hardness of this steel in its natural or annealed condition, special tools were required for forming and machining it, and even these did not work it rapidly, it was discovered.

Fortunately, at about this time a new alloy tool steel had been compounded which greatly aided in the working of the nickel chrome steel. This new tool steel is, generally speaking, an alloy of iron, tungsten and chromium, containing but a small per cent of carbon. It possesses the extraordinary property of becoming exceedingly hard when heated to whiteness and dipped in oil. The hardness thus imparted to the steel is not readily reduced by heating, and for this reason the tools made of this substance will hold a cutting edge even though the iron or steel shavings are heated to redness in the process of turning. It is questionable whether nickel chrome steel could have been successfully introduced into the motor car without the use of this special tool steel alloy.

Much difficulty was experienced with the nickel chrome steel, aside from the difficulty of working it. It is very sensitive to slight differences in temperature employed in tempering it, and to make sure of accurate results a pyrometer must be employed for every operation. Owing to this fact and to the further fact that nickel steel lends itself to a variety of uses, there has arisen a difference of opinion in regard to which of these materials is more suitable to employ. Many high-class builders use a limited amount of both in the different parts of their machines.

Vanadium Steel Follows

Closely following the nickel chrome steel came the introduction of vanadium steel, or more properly speaking, vanadium chrome steel, since vanadium alone is seldom used in motor car steels. The effect of vanadium upon iron and steel has been very carefully studied by J. Kent-Smith, to whom largely belongs the credit of introducing this valuable material. Much has been said and written about the peculiar effect of vanadium upon steel. It is generally conceded now that it acts largely as a scavenger, and exercises a beneficial influence on almost all of the carbon and alloy steels when introduced in minute quantity during the melting process. Its chief office seems to be that of removing the last traces of oxygen and oxides, as well as minute quantities of nitrogen, which latter element exercises a very bad influence on iron and steel even when present in exceedingly small quantity. It is perfectly certain that vanadium exercises a very beneficial effect upon the finished product, giving it closeness and fineness of grain, splendid elasticity, coupled with extraordinary toughness. Fortunately, in addition to these very desirable properties, the steel is sufficiently soft in its annealed state to be turned and machined like ordinary low carbon steel.

Difficulty in Case-Hardening

One difficulty in the manipulation of this steel is the persistence with which it resists case-hardening. While nickel steel takes up carbon readily at a temperature of from 750 to 800 degrees centigrade, under an exposure of from 2 to 4 hours, vanadium steel under the same condition and in fact in the same annealing box, shows only a slight penetration by carbon after an exposure of from 10 to 12 hours. This is probably due to its very dense character. It will, however, take up carbon slowly if exposed to a temperature of 900 degrees centrigrade. But a continuous temperature as high as this exercises a rather marked effect upon the furnace and annealing pots—in fact, in case-hardening this steel I have found it advisable to use graphite pots instead of cast-iron ones.

Besides the steels already mentioned, special grades of open-hearth steel may be employed for parts which are not required to resist special stress. And in cases where rigidity rather than high elastic limit is the prime requisite, a good moderately low carbon steel of high purity will answer as well as an alloy steel. As a matter of fact the writer has made a large number of tests which indicate that an open-hearth steel of moderate carbon content is stiffer than nickel steel, though

not quite so stiff as nickel chrome steel or vanadium steel.

No matter what steel is employed in the construction of a motor car, its full value is only obtained by suitable treatment. For instance, a 1½-inch square bar of nickel steel 6 inches in length supported at both ends, resisted a load of 900 pounds, when it took a permanent set. The same steel after treatment sustained a load of 2,700 pounds before taking the slightest set. A vanadium steel bar under the same condition took a permanent set under a load of about 900 pounds; after treatment it resisted a load of 4,000 pounds without taking the slightest set. In fact, the alloy steel before treatment will frequently show but little more strength than good untreated open-hearth steel. The nature of the treatment depends largely upon the use made of the steel, and each manufacturer has a treatment of his own which has been carefully worked out to meet the specific requirements in the various parts of the car.

Use of Crucible Steel Castings

Besides the various drop-forgings, which should never be made of Bessemer steel, high-grade crucible steel castings may be employed for certain parts of the machine. For example, a steel of this character is much better for rear axle housings than malleable iron; in fact, the latter substance, in the opinion of the writer, should have no place in the car excepting for elbows, tees, etc., which are not subjected to engine stress or road stresses.

The other metals beside iron and steel employed in the motor car are mainly bronzes of various kinds, including bearing metals, etc., and aluminum. High-grade babbitt metals are now employed to a considerable extent in the place of bronze, since they have the advantage of never cutting the shaft in case the oil supply should fail. Aluminum castings are employed by nearly all high-class builders for crankcases and gearcases. If properly designed, these castings give excellent results; and at the present price of aluminum, are probably as cheap as any that could be employed for the purpose. It is a notable fact that the Americans were the first to introduce both aluminum and nickel steel into motor car construction, though it is generally supposed that these progressive steps should be credited to the French. The extensive introduction of vanadium steel is also due to Americans.

With the improved design in mechanical parts and the introduction of high-grade alloy steels, together with anti-friction bearings wherever practicable, the motor car has been transformed from the uncouth and unreliable mechanism of a few years ago to one of the most perfect and reliable machines in use. It is certainly a high tribute to the scientist, the metallurgist, the engineer and the designer that this mechanism has been created and perfected within the last few years to such an extent that its power, endurance, reliability and speed are among the marvels of the age, and its operation rendered so simple that it can be manipulated and controlled with ease by one in no way skilled in the art of mechanics.

Materials Used by Motor Car Designers

By E. T. Birdsall, M. E.

IN the early days of the motor car industry in the United States little or nothing was known of the properties required in the materials of construction. For example: Aluminum was a novelty, cast-iron and bronze were used for the gear-wheels of the speed-change mechanism; roller bearings having unhardened rolls operated in soft axle-tubes as a bearing for soft steel solid axles; bronze and malleable iron were used for connecting-rods; the hardening and grinding of crankshafts and many other parts were unknown; brakes were lined with wood blocks; any yellow metal for bearings was "bronze," regardless of its composition; hardening meant "case-hardening" sometimes .001 inch deep, sometimes more, but always an indefinite amount.

Heat treatment, alloy steels and hardening as we know them today were practically unknown. Structural steel, bar, plate and rod stock; woods of various kinds; cast-iron; brass and bronze of the ordinary "merchant" shapes and qualities were alone available for the motor car builder. In Europe, on the other hand, the requirements of foreign gunmakers, engine builders and others had created a demand for special steels and bronzes. From the beginning of the industry in France the machines were entered in races and other competitions that developed in a few hours weaknesses and shortcomings of design in materials that would have taken months of ordinary use. Finding that increasing the size alone of a weak part to make it strong enough was not always the remedy, or even always feasible, the manufacturers naturally turned to the steel makers for better materials.

Right here another difference between the United States and Europe should be noted. In the United States the steel makers wanted "tonnage." That is, they would not get out a special grade of metal and set up the rolls to shape it unless an order for many thousands of tons was placed. Whereas, in Europe, the steel mills would take an order for a few hundred pounds of a steel of special composition.

The net result was that the French builders by races that tested the materials and design of construction, by the facility and possibility of procuring proper materials, by cleverness in design and by keen competition, soon distanced all other nations in the production of cars that were reliable, fast and dependable.

A concrete example of the above is furnished by the actual experience of one of the early American manufacturers who conceived the idea of building in this country an exact copy of a well-known and successful French car. After the first car was built the testing out proved that the American tubing used in the frame had only about one-half the strength and stiffness of the tubing used in the model. The gears would not stand up under the work and the wearing qualities and general durability of the entire machine were far below the French model. A careful investigation showed that the difference was solely due to the quality of the materials used.

As at that time practically no one here who was available knew the difference between the materials in the model and the copy, and there were not procurable in this country materials from a constructive and commercial point of view, that would answer the purpose, the manufacture of the car was discontinued. Conditions in the American engineering talent and material market have in the last 3 or 4 years completely changed. We now know what material to use in each particular place, how to use it, where to get it, and why we use it.

It is, moreover, a fact that the reverse of the above mentioned case has happened. An American manufacturer in 1899 and 1900 produced a number of 8-horsepower cars, with a single-cylinder-vertical-in-front engine. The owner of one of these cars appeared within the past 2 months at a New York salesroom and stated that he still used his little 8-horsepower original American car, and that the bearings and all of the parts had stood up wonderfully well. This car must have had excellent material and admirable design. As a matter of fact one of the largest manufacturers in Germany acquired in 1898 exclusive rights to manufacture this same car of American design and on American specifications for material. All the detailed drawings were converted into the metric system and sent to Europe with a model and some parts. The car, though well-known and successful in the United States, was not satisfactory when made by the German maker with European material.

The American industry has grown to such proportions that steel and other material manufacturers seek and cater to the wants of the car builder. At the present time there is not, and in fact for some time past, there has not been the difference between the foreign and the domestic car that formerly existed. If the American engineer is not satisfied with American materials, all kinds and grades of foreign materials can now be procured in stock in the American market, and at prices commercially practicable.

Among the Makers and Dealers

Berliet in New York—Albert T. Otto & Co., have taken the French Berliet agency for New York, it being placed by the Berliet Import Co., of Chicago.

Another New One—The Knick-Wegemann Motor Car Co. has been formed at Watertown, Wis., to deal in cars and operate a garage. The company will open at 208 Second street, Watertown, on February 1.

National Agent in New York—The Poertner Motor Car Co., 1876 Broadway, New York city, has been appointed distributor for the National line in New York city and vicinity. The company is controlled by W. C. Poertner.

Van Sicklen in Trade—N. H. Van Sicklen, Sr., of Chicago, long identified with bicycle and motor publications, has become a tradesman, and the first of the month he will become manager of the Knox company's Chicago branch, which recently moved into handsome new quarters at 1458 Michigan avenue.

Denver Changes—The Denver Rubber Tire Works, 28 West Colfax avenue, has been named as Denver agent for the Velie car, and the John Deere Plow Co. branch in Denver is the general agent. W. W. Barnett, agent for the Stoddard-Dayton, has moved into the new building at 30 West Colfax avenue, from 1333 Broadway. George E. Clarke, formerly vice-president and manager of the Denver Motor Car Co., has severed his connection with that corporation and accepted a position as salesman with the Studebaker branch in that city.

Lozier New York Branch Moving—On February 1 the Lozier headquarters in New York will be moved from Fifty-fifth street and Broadway to the northeast corner of Fifty-ninth street and Broadway, and the present Lozier building will be occupied by the Buick company. The building now occupied by the Lozier company at Fifty-fifth street was built 3 years ago on a long-term lease, and in addition to the Broadway salesroom the general offices and repair shop of the company are housed in the building, which is a four-story-and-basement structure. At the time it was erected it was thought that it would serve the purpose of the company for a number of years to come. The rapid growth of the Lozier business some time ago made a change imperative, and when the big five-story building at the corner of Fifty-sixth street and Broadway came into the market, Mr. Lozier took advantage of an opportunity of disposing of the Fifty-fifth street corner and secured the building at Fifty-sixth street and Broadway for a long term of years. This new building, which was built for the Hol-Tan company several years ago, gives the Lozier company more than double the present space.

Maxwell Sick Benefit—Employes of the Maxwell-Briscoe Motor Co., at Newcastle, Ind., have formed a sick and accident benefit association and will pay weekly benefits to those who are ill or injured. The organization now has a membership of over 300 Maxwell employes.

Praises Maxwell Plant—John Fitzgibbons, of the Indiana state factory inspection bureau, has just completed an inspection of the plant of the Maxwell-Briscoe Motor Co. at Newcastle. In commenting on the inspection, Fitzgibbons said: "The Maxwell-Briscoe factory is the most complete and the best arranged institution in Indiana. I have absolutely no official criticism to make of it."

Garage for Jackson, Miss.—R. S. Withers has secured a building with 6,000 feet of floor space on the corner of State and Pensacola streets, in Jackson, Miss., and will open up a garage and repair shop on February 15. This is the first garage opened in Jackson, or in that part of the state. Withers will have the agency for the E-M-F and probably for the Buick.

Moving to Elwood—Negotiations have been completed between the Commercial Club, of Elwood, and the Detroit Auto Truck Co., of Detroit, Mich., whereby the motor concern will move to the Hoosier city. Buildings formerly occupied by the Pittsburg Plate Glass Co. have been purchased by the Commercial Club for $15,000 and turned over to the truck company. It is understood the new factory will be ready for occupancy May 1 and that the company expects to employ between 300 and 400 men.

Enlarged Franklin Factory—A four-story-and-basement addition to the Franklin factory in Syracuse, N. Y., has just been occupied for general office and manufacturing purposes. This adds 39,000 square feet of floor space, making a total for the factory of 236,085 square feet. A visit to the enlarged plant shows sixteen hundred employes at work, with night and day shifts. Quarters for the engineering department are provided in the new addition. In the main building are also the experimental department, the machine shop, the metal body department, the trim shop and the printing office, besides several stock rooms. In an adjoining building of similar structure are the paint shop, the wood shop, the engine assembly and the final assembly room. In various other buildings about the 6-acre site are the final test room, the power plant, the repair department, the traffic department and other branches, while it has been found necessary to lease room in two buildings not far distant for storage purposes.

Peerless' New York Store—The Peerless company has secured ground in New York city and will again build. The new plant will be located at Broadway and Fifty-seventh street, with a 70-foot frontage on Broadway and 25-foot front on Fifty-seventh street.

Taxicab Line for St. Louis—Following the success of three taxicabs that have been operated for nearly a month by the Mississippi Valley Automobile Co., it is not surprising that St. Louis is to have a real taxicab company. J. H. Phillips, formerly manager of the Mississippi Valley company, is manager of the new organization. The cabs will be Atlas machines and the St. Louis Taxicab Co., at 5011 Delmar boulevard, will besides have a line of these cars for sale.

McCue Builds Plant—The McCue Co., builder of the McCue-Hartford motor cars, has erected a two-story brick building 47 by 212 feet on Pliny street, Hartford, Conn. The front of the building will be devoted to the office and the remainder to the shop proper. The McCue company started work on the new building in November and it is nearly completed. At present the company is located on Capitol avenue, which quarters have become too crowded for the successful carrying on of the increasing business.

Stoddard in Mexico—Sigmund Krausz, foreign representative of the Dayton Motor Car Co., has just returned from Mexico, where he has established Stoddard-Dayton agencies. Mr. Krausz succeeded in establishing agencies for his company in Havana, Rio de Janeiro, Montevideo, Buenos Ayres and in Mexico City. In the latter city Krausz has found American cars well represented, but Mexican dealers in general make the mistake of representing too many concerns, he says, thus considerably lessening the chances for the success of any one car. The Stoddard-Dayton agency in Mexico City will, however, handle exclusively the product of the Dayton Motor Car Co. A large garage is to be secured and some new features introduced in the remodeling of the quarters, especially in the housing of customers' cars. Frederick Vedegaray, the newly-appointed agent, will have associated with him some men well known among the Mexican motoring public, and an experienced man from the factory will look after the mechanical end of the business. Krausz thinks the Mexican capital an ideal motoring town, as far as roads in the city and

environs and general police regulations are concerned, and he is convinced that American cars, in spite of the existing prejudice in favor of the French, Italian and German machines, are steadily gaining ground there.

Olds Branch in Syracuse—H. D. Van Brunt, eastern supervisor for the Oldsmobile, has completed negotiations for the opening of a branch office in Syracuse, N. Y. It will be used as the distributing point for central New York and all points east of Syracuse.

Reo in Philadelphia—The Reo, which for several months past has been unrepresented in the Quaker City, will be looked after there in future by the Reo Motor Car Co., of Philadelphia, just organized, with newly-fitted-up quarters at 338 North Broad street. G. L. Derrickson has been appointed manager of the new concern.

Made Chadwick Branch Manager—Lawrence C. Fuller, formerly of the firm of Thornton & Fuller, which a few years ago handled several foreign cars in Philadelphia, has been appointed general manager of the Quaker City branch of the Chadwick Engineering Works, of Pottstown, Pa., with headquarters at 254 North Broad street.

Bankers Reorganize—The Banker Brothers' Co., of Pittsburg, has reorganized with the following officers: President, C. N. Miller; vice-president and general manager, Robert T. McCurdy; secretary, J. D. Davis. The company will continue to handle the Pierce-Arrow, Stevens-Duryea and the Chalmers-Detroit. The concern will continue its old name.

Again the Motor Car—The superior qualities of mechanical vehicles were again demonstrated at St. Louis the night of a recent blizzard. As is often the case, it was "motor car to the rescue," and this time a valuable residence in the suburbs of St. Louis was saved by the timely arrival of the Locomobile fire car of the salvage corps. It took the car 20 minutes to make the run through the snowstorm. Horse-drawn apparatus arrived 2 hours later on in the evening.

Columbia's December Business—Halsey M. Barrett and Henry W. Nuckols, receivers of the Electric Vehicle Co., have filed their report of business done during the month of December, with the superior court. The Selden patent royalties helped somewhat to swell the cash statement. The report shows charges on account and cash sales of $32,895.34 and purchases of $26,283.65. There was collected by the receivers on the Electric Vehicle Co. accounts, $3,138.38 and on the receivers' own account, $36,266.49, while the Selden patent netted $1,311.92 and interest of $782.32 brings the total receipts up to $41,499.11. Of the disbursements, $29,518.52 has been for the factory pay roll. The A. L. A. M. received $1,139.40. The cash balance on deposit in the local bank and the Chase National Bank of New York city is $141,812. It is said on good authority that a reorganization will be effected very shortly.

Jobbers of Buicks—Strait & Shaw, of Wolcott, N. Y., have secured an exclusive agency arrangements on a jobbers' basis for the sale of Buick cars in six counties in New York state.

Starts Spark Plug Exchange—J. H. Story has established the Spark Plug Exchange at 1509 Spring Garden street, Philadelphia, where he announces that he is prepared to make repairs to all kinds of spark plugs and chains.

Robbins Handling Oakland—The Centaur Motor Co., of Buffalo, general selling agent for the Oakland Motor Car Co., of Pontiac, Mich., has established a branch at 1725 Michigan avenue, Chicago, the quarters formerly occupied by the Rainier Co. The company will have charge of the sale of Oakland cars in Chicago and immediate vicinity. Arthur M. Robbins, formerly with the Aerocar Co., of New York, and later with the Rainier in Chicago, will have charge of the new branch.

Pierce Name Changed—Colonel Charles Clifton has announced the formation of the Pierce-Arrow Motor Co., to take over the property, business and good will of the George N. Pierce Co. This action amounts to only a change in the official name of this company. In order to surely provide adequately for the present business of the concern, and for future development, the capital stock of the company has been very materially increased. The home of the company, of course, remains at Buffalo. The principal officers of the company are the same, the directors being George H. Birge, president; Charles Clifton, treasurer; Henry May, vice-president; Laurence H. Gardner, secretary, and William B. Hoyt.

PLAN OF NEW PEERLESS STORE IN NEW YORK

Wrong Cut Used—The attention of Motor Age readers is called to the fact that in the January 14 issue the illustration in the advertisement of the Maxwell-Briscoe Motor Co. was of a 1908 instead of the 1909 model. This car was designated model A and should have been the model DA Maxwell.

Barton a Bankrupt—E. T. Barton, who formerly conducted a tire repair establishment in Hartford, Conn., has filed a petition in bankruptcy and has declared under oath that he has not the necessary $30 to pay the filing fee. By his schedules he admits liabilities of $4,159.49 and claims assets of $2,367.20.

New Tire Agency—The Philadelphia Rubber Tire Co., Saul Levy manager, will, after the completion of repairs now in progress, open up large salesrooms at 680 North Broad street. A full line of mechanical rubber goods, clincher and solid tires and other rubber products will be carried. Mr. Levy was formerly connected with the local G & J tire agency.

Has a New Home—The Packard Electric Co., of Warren, O., recently completed a substantial brick building comprising a basement and two stories. This addition was necessitated by the natural growth of the business. A portion of the much-needed floor space is utilized for offices, a part is occupied by the transformer department and the balance gives much-needed additional space for the handling of insulating materials and ignition cable.

Milwaukee Enjoined—The Johnson Service Co., of Milwaukee, maker of the Johnson car, has again enjoined the city of Milwaukee from purchasing a car for the police department. When the council appropriated money for a car, the board of public works decided on the Locomobile, on advice of the police chief after testing all makes. The purchase was nulled by an injunction secured by the Johnson company. The board then advertised for competitive bids, and on the day the bids were to have been opened a second injunction was served.

Pope Receivers Report—Albert L. Pope and George A. Yule, receivers of the old Pope Mfg. Co., have rendered their report covering the business done under the receivership from November 30 to December 23, 1908. It will be remembered that the concern was reorganized the latter part of December, hence the report covers business done up to that time. The balance in bank and cash on hand in the company's office November 30 last was $75,225.49, the cash receipts for the period total $152,655.51. The disbursements amount to $142,341.14. Except for minor details the receivership is practically at an end, though some little time may be required to complete everything.

Development Briefs

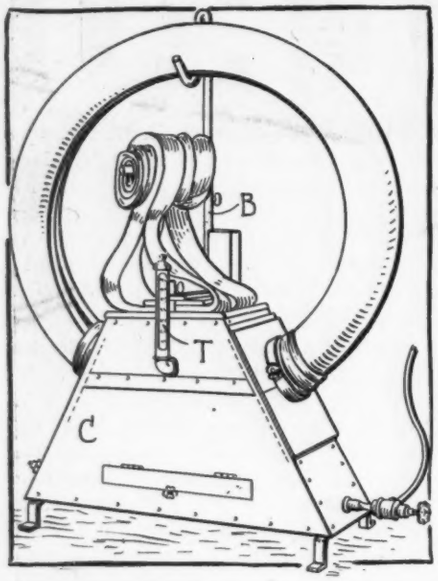


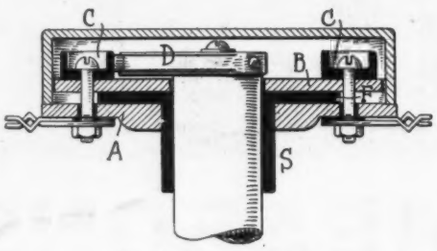
FIG. 3—SAVE-TIRE VULCANIZER

SAVE-TIRE GARAGE VULCANIZER

THE Save-Tire Co., Grand Rapids, Mich., has brought out a new vulcanizer designed for garages and owners wishing to make their own repairs. As shown in Fig. 3, this vulcanizer consists of a light asbestos-lined cabinet C, containing a copper heat jacket H, Fig. 4, through which any sized casing may be suspended. The upper portion of the cabinet is removable for the insertion of casings, while the flat top surface used for the repair of inner tubes is capable of vulcanizing two tubes at a time. An adjustable bracket B at the rear is provided for the support of tubes and casings. A thermometer T centrally located in front of the upper portion is fitted for heat regulation. Using gas heat, which maintains an even temperature, little attention is required during the process of vulcanization. City gas or acetylene may be used.

NEW SHOCK ABSORBER

Wellington P. Kidder, Boston, Mass., has invented a new shock absorber which will soon be placed upon the market. The claimed features of this device are that it does not interfere with the freedom of the springs in their easy normal play, is effective in both compression and rebound, is protected from dust, requires little adjustment, and is self-lubricating for long periods. As shown in Figs. 1 and 2, the absorbing agent is a coil spring and plunger P enclosed with and acted upon by a cam device attached to the side member of the frame of the vehicle. Fig 1 shows the normal position, the casing bolted to frame B of the vehicle and the upper end of connecting rod pivoted to



PALMER-MOORE TIMER

crank with its lower end attached to the axle. The progressive resistance to rotation, due to the shape of the cam, renders a rocking action to opposite dead centers equally effective. Fig. 2 shows the extreme position of the device at the upward limit of the spring deflection. Approaching either of the extreme positions, the connecting rod thrusts or draws nearly across the dead center X of the crank, loosing its rotative leverage, while at the same time, encountering the resistance of the spring pressed plunger H. The excess load is taken by the crank, the plunger serving to gradually arrest rotation before the dead center is reached.

MAKING CAR PARTS

The General Mfg. Co., Elkhart, Ind., has started a standard line of motor car parts, making two types of cone clutches for cars ranging from 20 to 60 horsepower; two selective type sliding gear transmissions with three forward speeds and reverse for 30 and 50 horsepower cars, and also two sides of planetary transmissions. A feature of its model P cone clutches is the covering, which is composed of woven brass wire with asbestos and canvas weave made in one piece to fit the cone.

PALMER-MOORE TIMER

The Palmer-Moore Co., Syracuse, N. Y., is introducing a new timer which consists of a brass sleeve S with a flange F extending between two disks, one of brass,

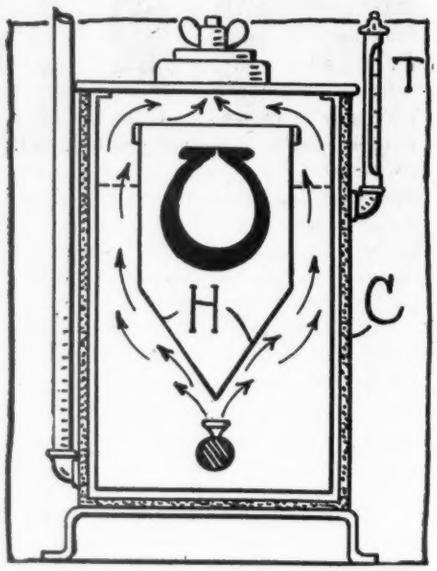
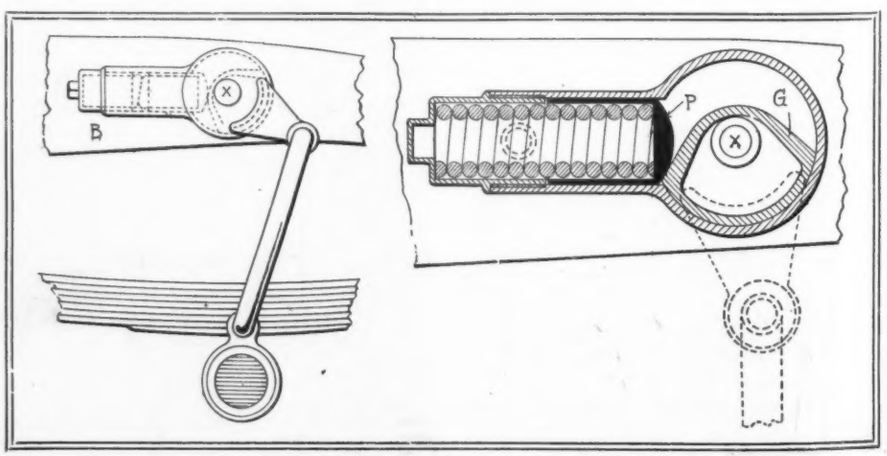


FIG. 4—SAVE-TIRE VULCANIZER

the back plate A, and the other of fiber B, carrying the contact pieces C. These disks oscillate on the sleeve to advance or retard the spark, the flange between affording the friction necessary to hold them in any desired position. The revolving brush D is made of steel and pinned to the stubshaft with a taper pin. All other parts except the steel contacts and fiber disk are made of brass.

WILLARD SEARCHLIGHT

The Willard Storage Battery Co., Cleveland, O., has brought out a new hand searchlight to be used in case of trouble with headlights, tire repair at night, etc., which may also be used in reading house numbers, or signs along the road. It consists of a tungsten bulb, placed in a parabolic reflector with an extension cord running through the handle which can be attached to any 6-volt storage battery. This company also handles a line of electric lighting outfits.



FIGS. 1 AND 2—KIDDER SHOCK ABSORBER